NUMBER 14

WATER PUMP SERVICE

SHOP TALKS

for

INTERNATIONAL TRUCK SERVICEMEN

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Ave. CHICAGO, ILLINOIS

WATER PUMP SERVICE

Water pump service on International motor trucks is not at all difficult if prescribed methods are followed. It is the purpose of this Shop Talk to outline specific procedure for servicing water pumps.

Certain specially designed tools are necessary for correct servicing of pumps. Reference to these tools will be made throughout by their SE numbers.

Water pump kits containing parts generally required in pump overhauls are available through the Parts Department. Announcement of these kits was made in Motor Truck Service Bulletin No. 83-'40.

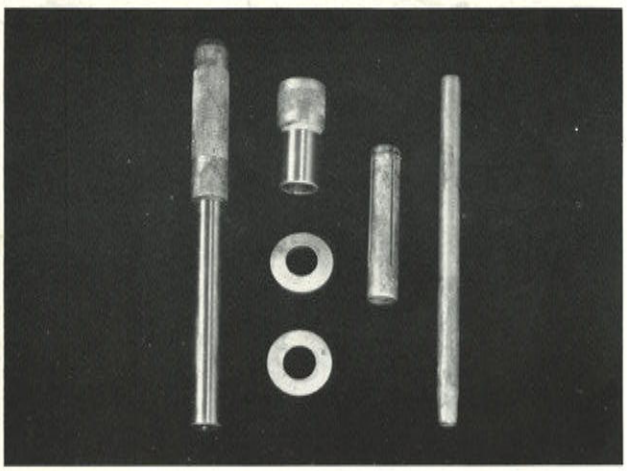
All tools mentioned in this Shop Talk are available through the Motor Truck Service Division, Chicago Office, for International Harvester Company-Owned service stations. International dealers and others can secure them through Hinckley-Meyers Co., Jackson, Mich.

In the case of all pump servicing, care must be exercised in the cleaning and checking of all parts. To re-install a part about which there is a question as to its condition is false economy.

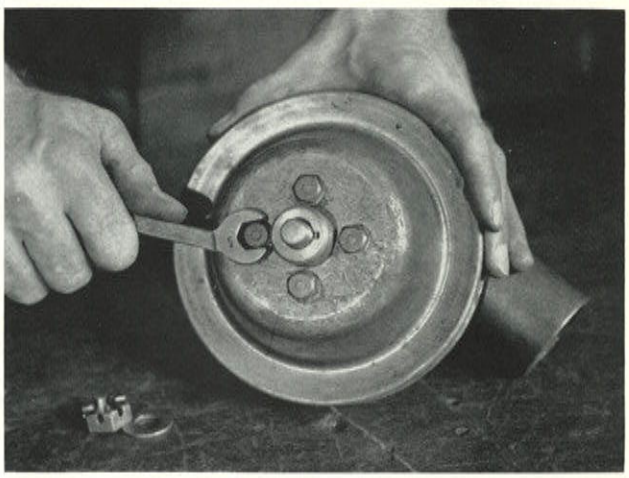
When cleaning parts, use one of the Stoddard Solvent solutions. *Do not use gasoline for cleaning.*

For the sake of clarity and simplicity each type of pump will be dealt with individually in this Shop Talk.

Waukesha FK and FC Engines

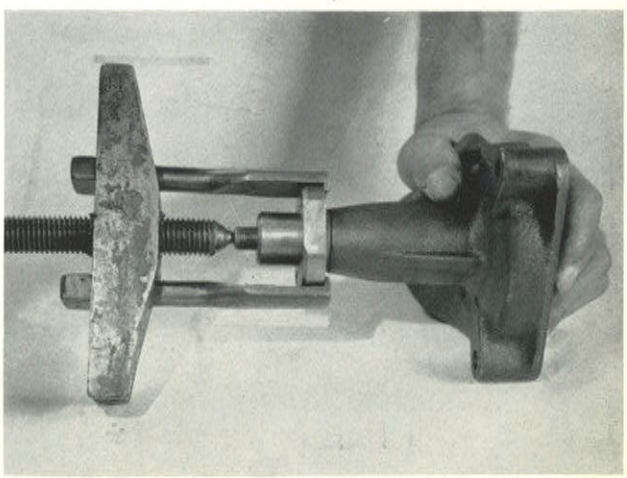


1 Here are the special tools (SE-1027) required for servicing this pump.

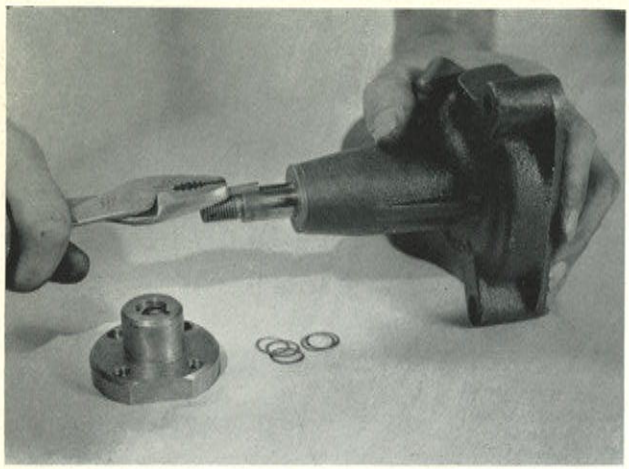


3 Remove capscrews retaining fan and fan pulley to pulley hub. Remove pulley. (Fan blades not shown).

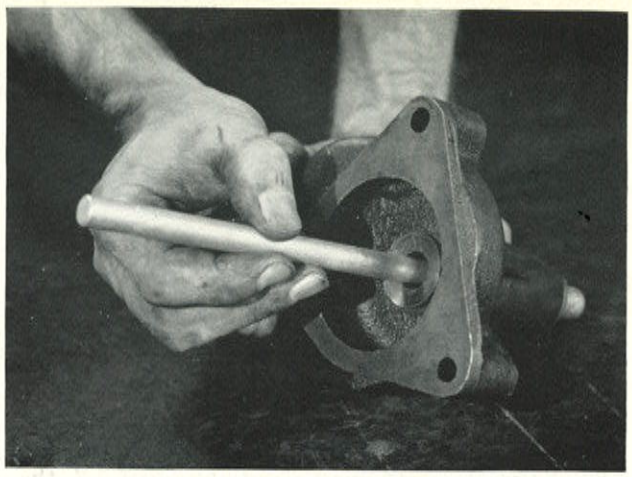
2 Remove fan hub nut and washer. (Fan blades not shown).



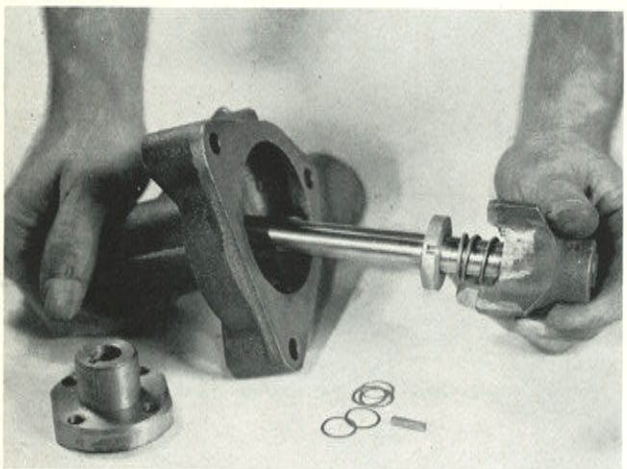
4 Remove fan pulley hub. Use a puller similar to SE-967 as shown.



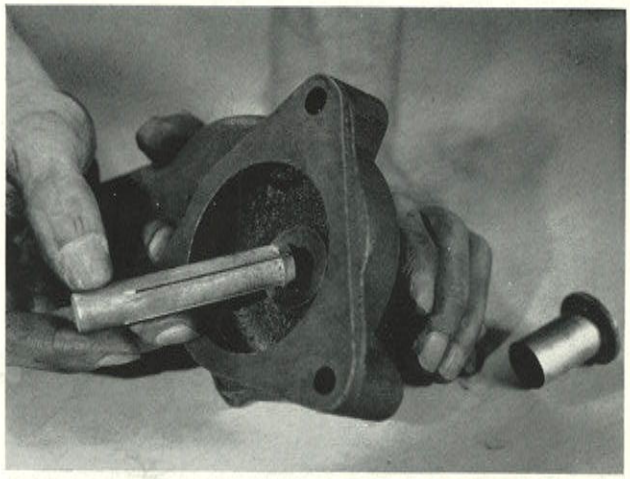
5 Remove pulley retaining key and end-clearance control shims.



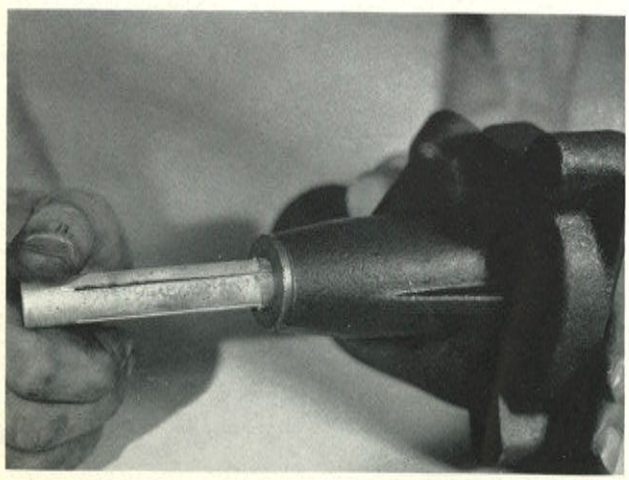
8 Now, insert sleeve punch (SE-10276) through *rear* bushing into expansion sleeve (SE-10275) as shown. Press out bushing.



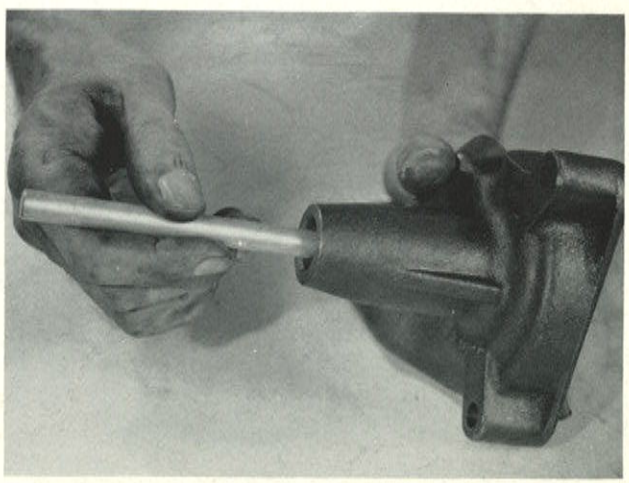
6 Remove impeller shaft with seal ring and thrust spring.



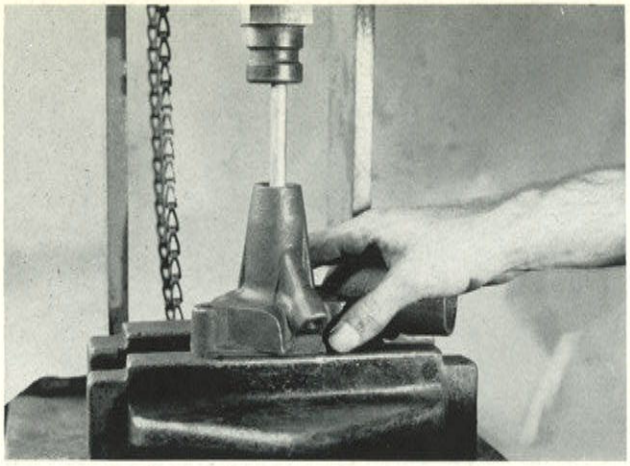
9 To remove *rear* bushing, insert expansion sleeve (SE-10275) into *rear* bushing.



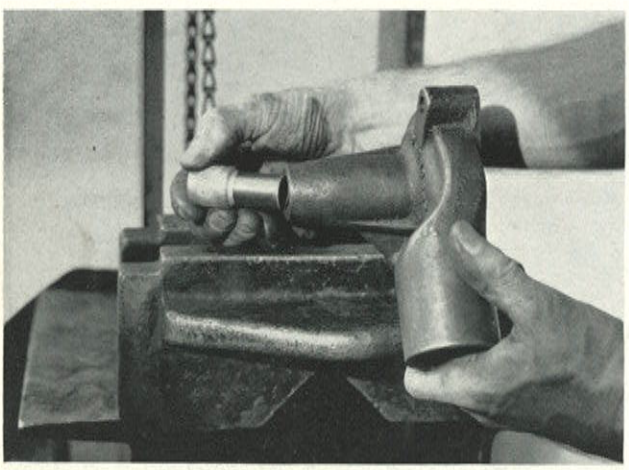
7 To remove *front* bushing, insert special expansion sleeve SE-10275 into *front* bushing.



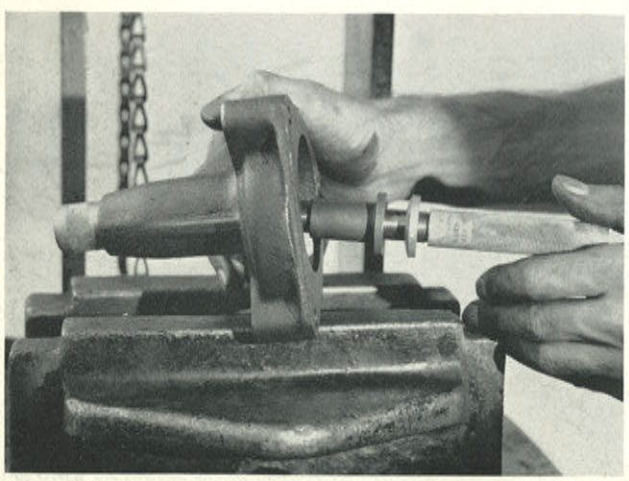
10 Then—insert sleeve punch (SE-10276) through *front* bore into expansion sleeve (SE-10275).



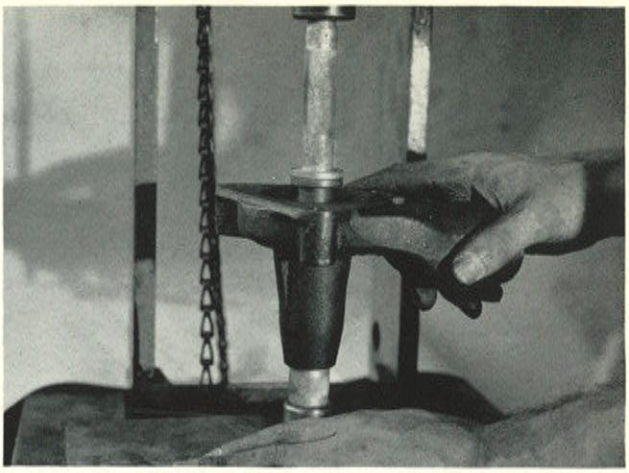
11 Press out bushing as shown. Prior to reassembly, soak new bushings in light oil as they are made of a porous material. There are no oil holes in these bushings and no holes should be drilled into them.



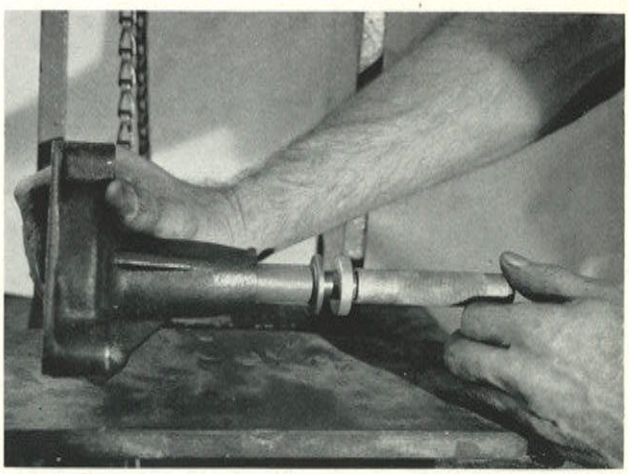
12 When ready to install new bushings insert arbor pilot sleeve (SE-10272) into the *front* bushing bore as shown.



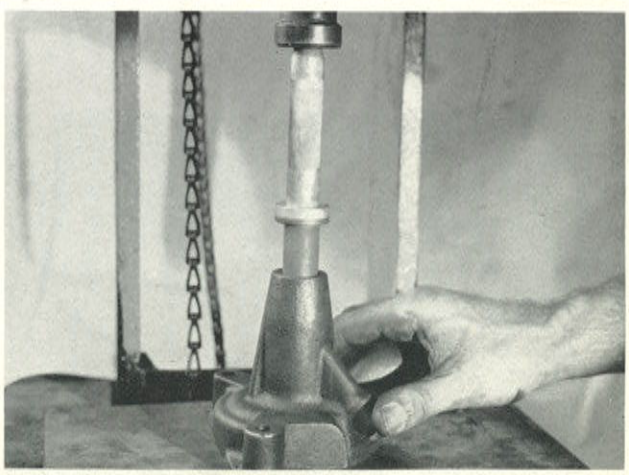
13 Place new *rear* bushing on arbor (SE-10271) after first placing convex washer (SE-10274) on arbor with convex surface next to bushing.



14 Press *rear* bushing into place. Arbor (SE-10271) will pilot into pilot sleeve (SE-10272).



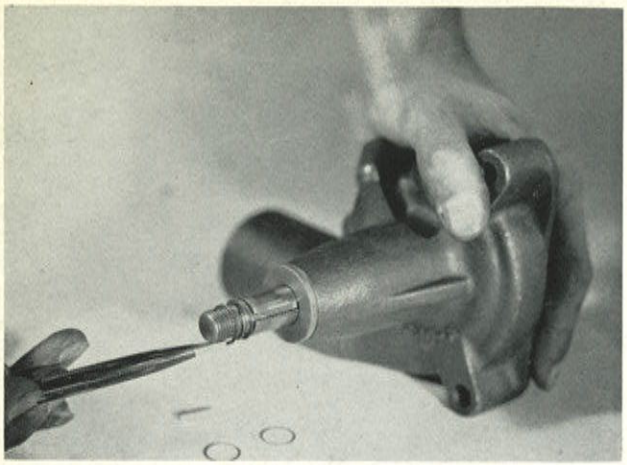
15 Place flat washer (SE-10273) on arbor (SE-10271) and then place new *front* bushing on arbor as shown.



16 Press *front* bushing into place. Arbor (SE-10271) will pilot in *rear* bushing.

No reaming or burnishing is required for these bushings. They are of proper size.

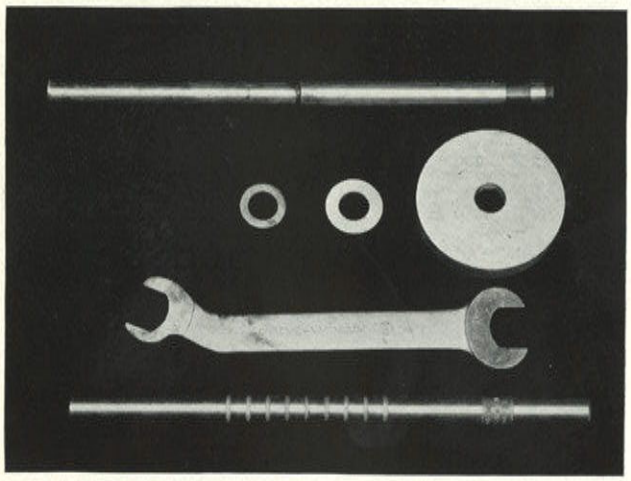
The pump reassembly is accomplished easily, from this point on.



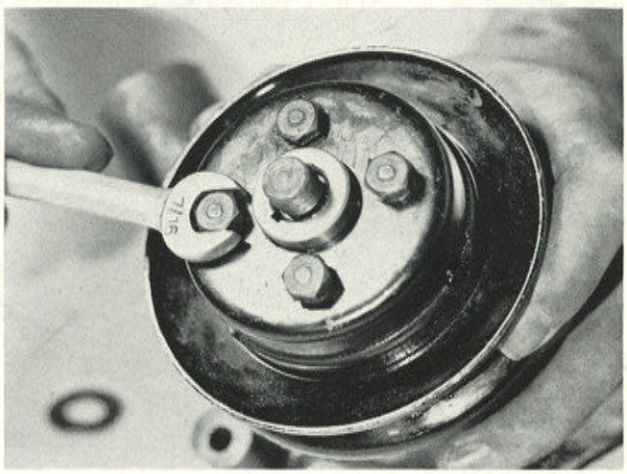
17 Shims are used on the impeller shaft inside the hub. Their purpose is to control end play to—from .005″ to .020″. Shims may be added or removed as necessary.

International HD Engines

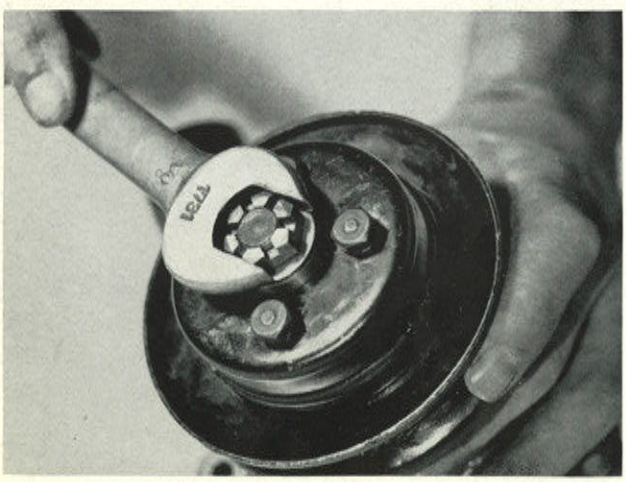
Service of water pumps on HD series engines requires special tool equipment.
The *front* bushing is a porous bronze bushing while the *rear* bushing is a split bronze bushing. A needle-type bearing is available for service if required for the front of the pump in rep'acement of the porous bronze bushing.



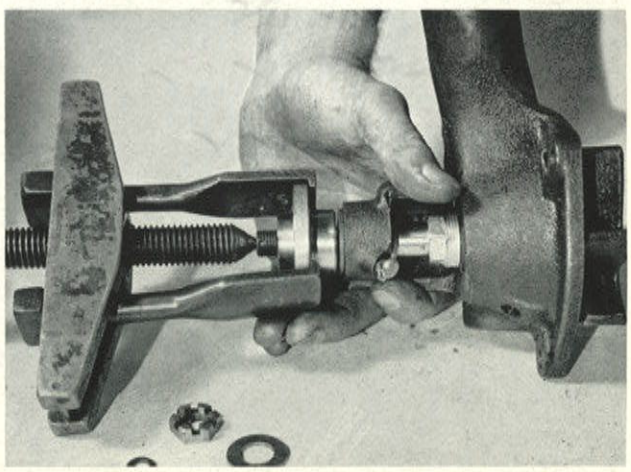
1 Special tools required for service on HD engines are shown above.



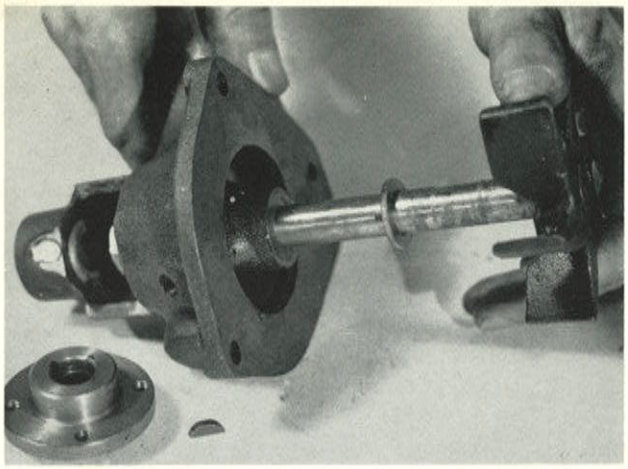
3 Remove capscrews holding fan pulley. (Fan blades not shown).



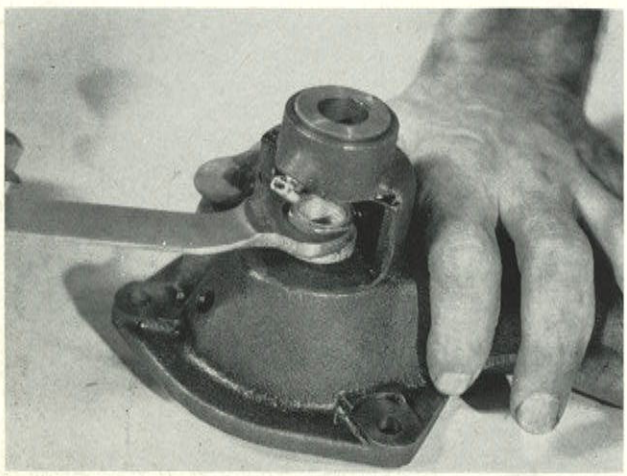
2 Remove fan locknut and washer as shown. (Fan blades not shown).



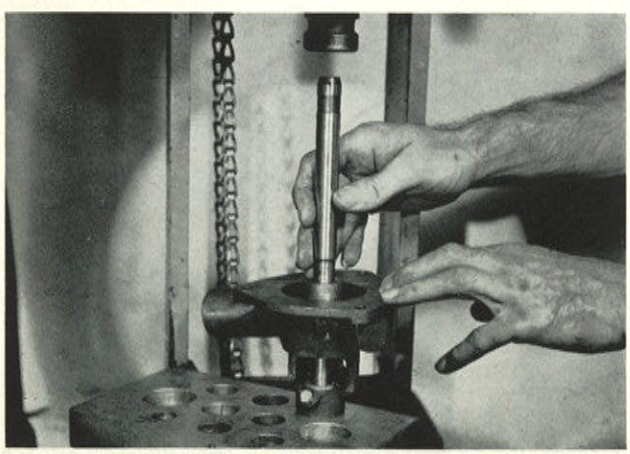
4 Remove fan drive hub. Use puller similar to SE-967 as shown. Remove retaining key.



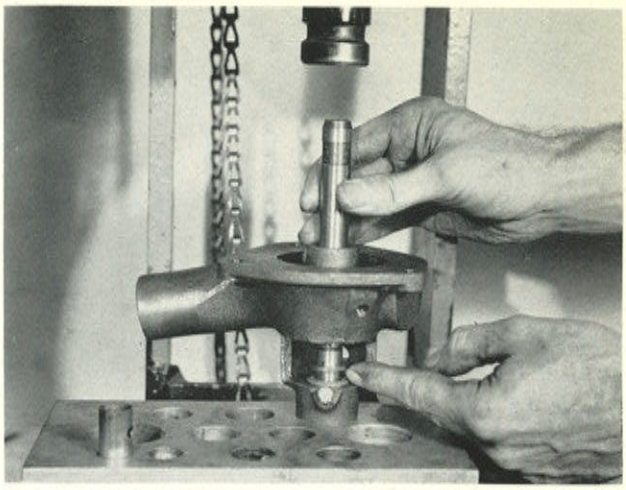
5 Remove pump impeller shaft and thrust washer as shown.



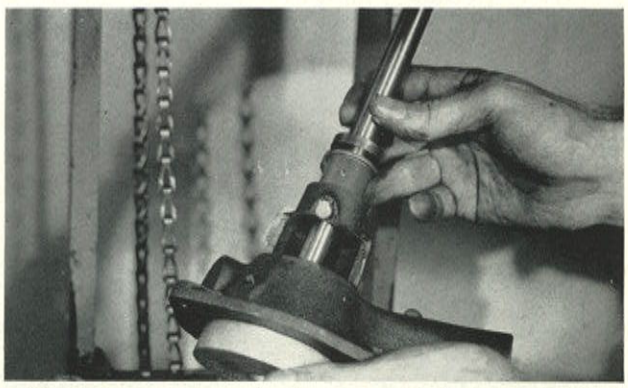
6 Remove packing gland nut and pump packing. Special wrench (SE-969) is adapted to fit this packing nut.



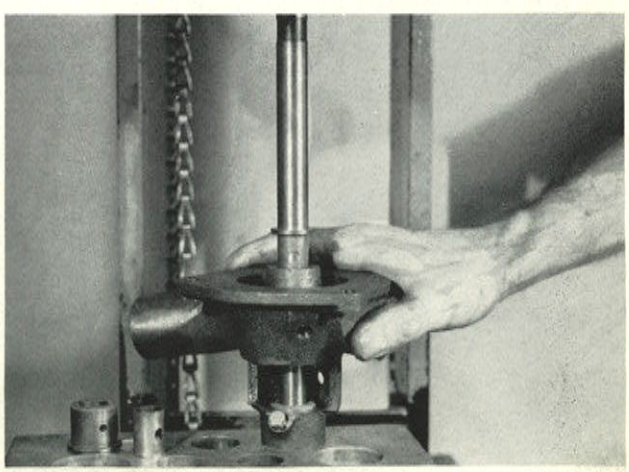
7 Removal of the *rear* or split bushing is accomplished as follows: Place pump on a support block such as SE-1033 shown. Insert special arbor (SE-963) into *rear* bushing. Press out bushing.



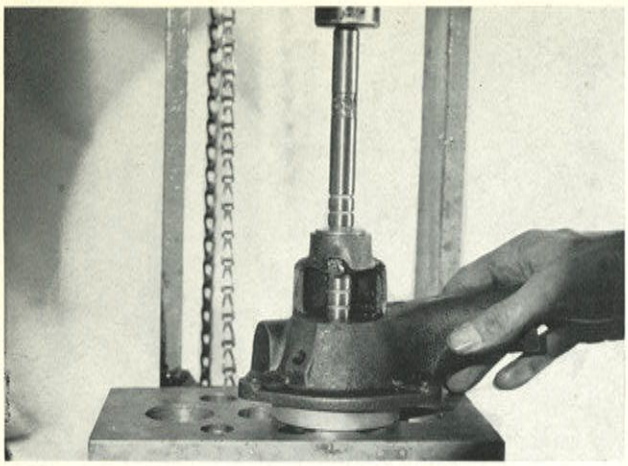
8 After pressing out *rear* bushing place small special washer over arbor (SE-963) as shown. Press out *front* bushing.



9 Support pump body on special support block (SE-968). Insert arbor (SE-963), on which large special washer and new front bushing have been placed into *front* housing bore. Press bushing into place. *NOTE:* If bushing has oil hole—be sure it is lined up with oil cup.



10 Invert pump—Place new *rear* split bushing on arbor (SE-963) with special small washer. Piloting arbor in *front* bushing press *rear* bushing into place as shown. *NOTE:* Be sure oil hole lines up.



11 Support pump body on support plate (SE-968) below *rear* bushing. Insert burnishing bar (SE-964) through *front* bushing as shown. Burnish *rear* bushing. *Use lard oil on burnishing bar.*

Further reaming or burnishing is not required for both bushings will now be to proper size.

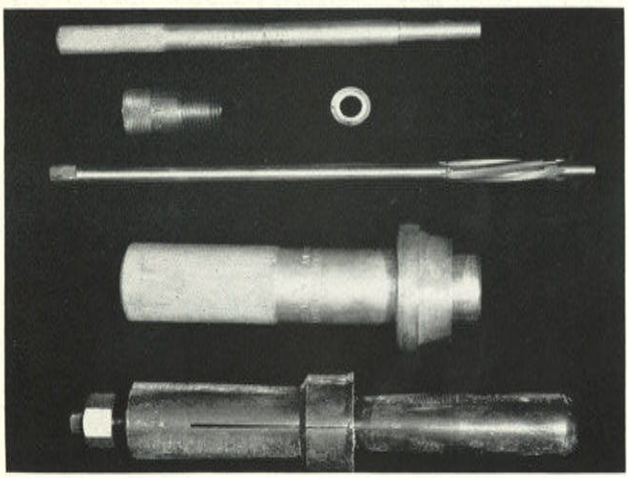
Reassemble pump parts. When adjusting packing gland nut use special wrench (SE-969) as shown in Figure 6, Page 6. Be careful not to tighten excessively for a scored shaft might result.

NOTE: Prior to installation of grease cup, test for free passage of lubricant through cup.

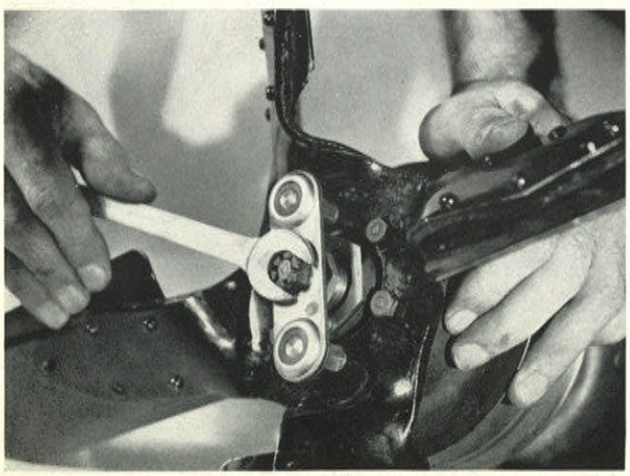
International FAB and FBB Engines (Not K-Line Trucks)

The construction of the pumps on FAB and FBB engines (Not K-Line International Trucks) is quite similar. The fan pulley is bearing mounted and the assembly can be serviced separately.

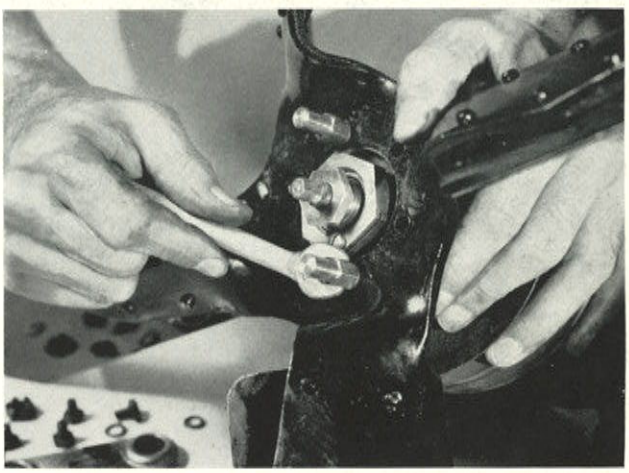
An FBB engine pump is used in the following description. The same procedure is followed with FAB pumps.



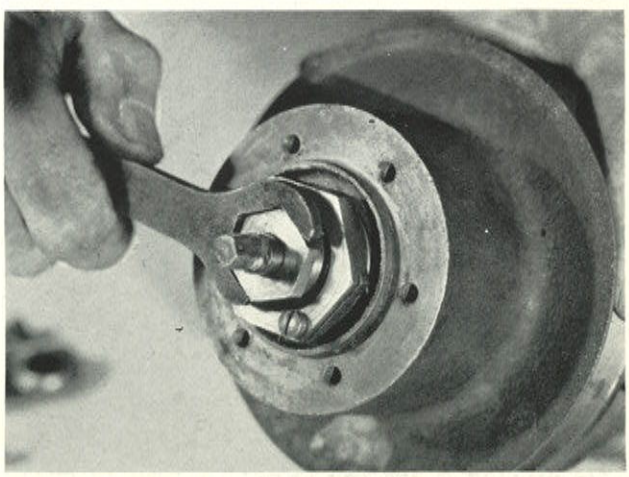
1 The special service tools required for this type pump are shown above.



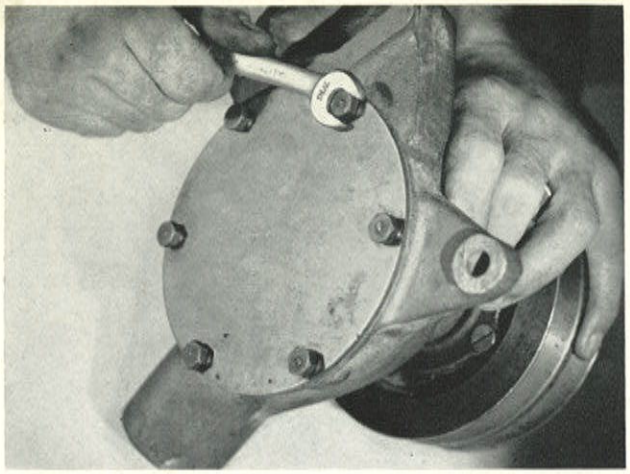
2 Remove cotter key and impeller shaft nut as shown. Remove fan blade drive coupling.



3 Remove fan retaining capscrews and fan drive lugs as shown. Remove fan blade.

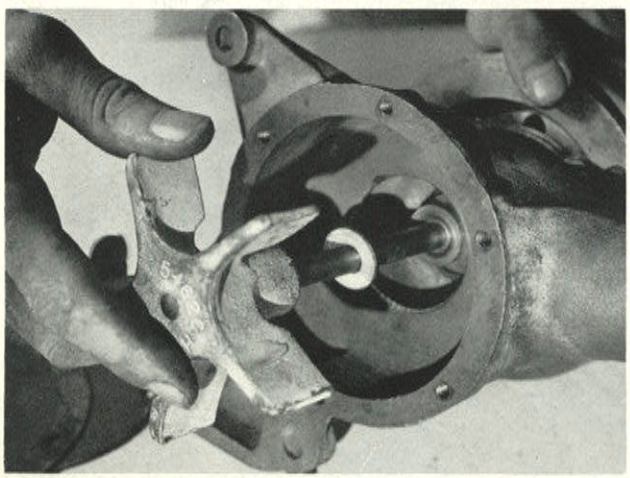


4 Remove packing gland nut using special packing nut wrench either drawn from the parts department or borrowed from the truck tool kit.

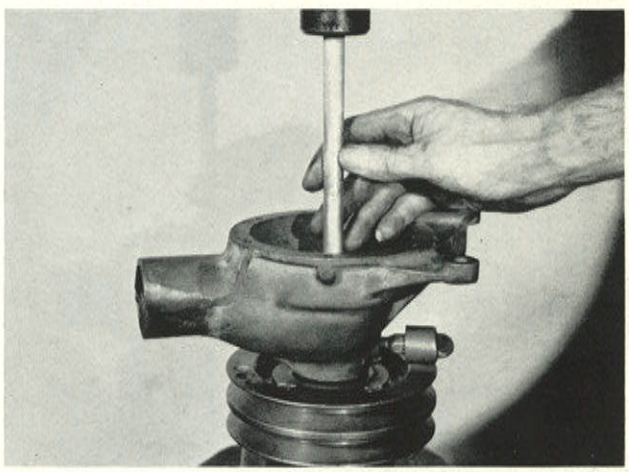


5 Remove capscrews from pump cover plate. Remove plate and gasket.

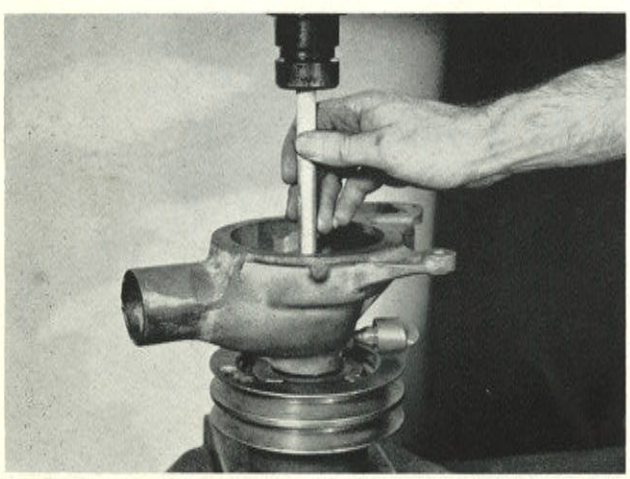
8 Place small washer on arbor (SE-12683), flat side outward, and place new bushing on arbor.



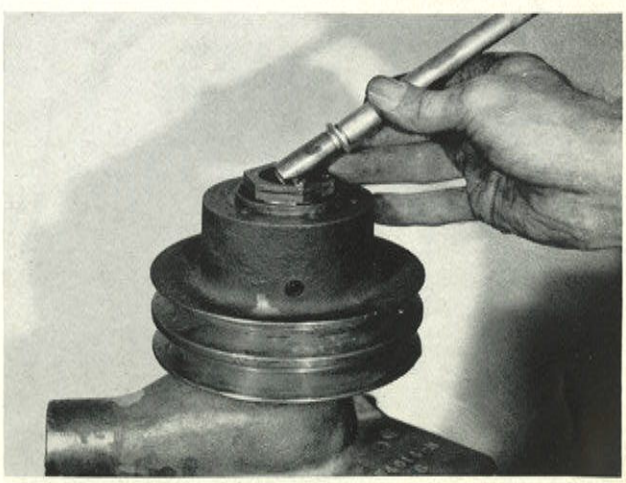
6 Withdraw impeller shaft and thrust washer as shown.



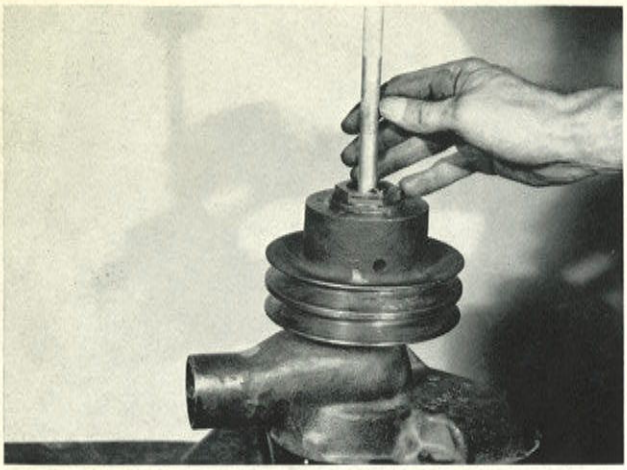
9 Press new bushing into position as shown.



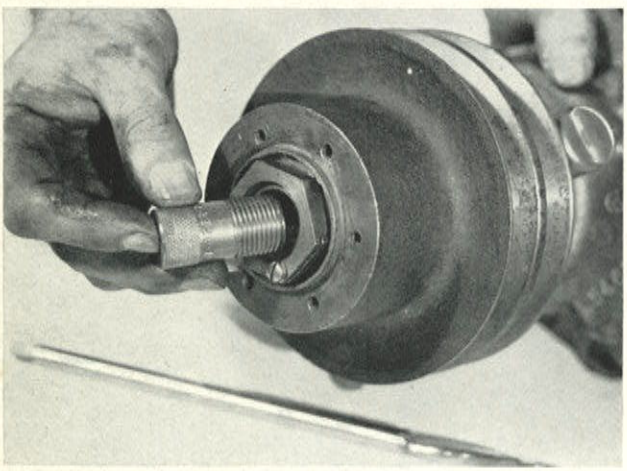
7 Using special arbor SE-12683, and with pump supported on press, remove both shaft bushings. Packing glands will also be pushed out at this time.



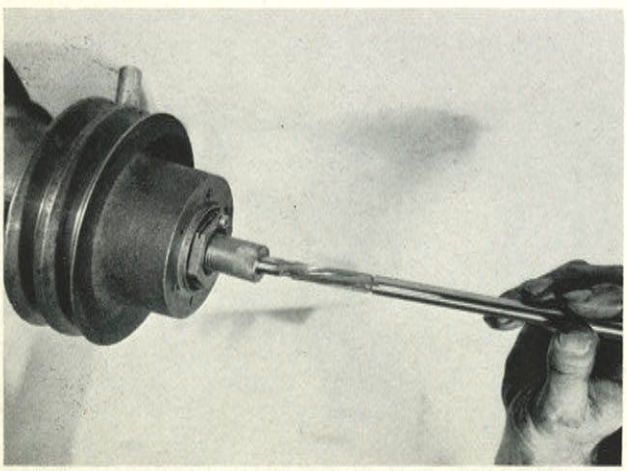
10 Invert pump. Place small washer—convex side out—on arbor (SE-12683) and then place new bushing over arbor.



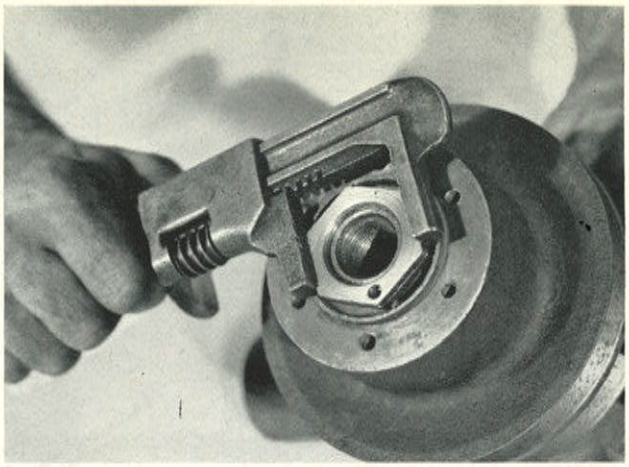
11 Press new bushing into place as shown above. Washer will prevent pushing bushing in too far.



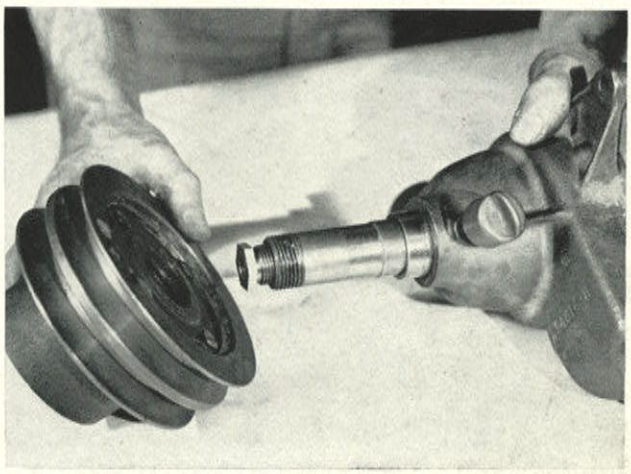
12 Screw adapter pilot guide (SE-12682) into pump sleeve as shown.



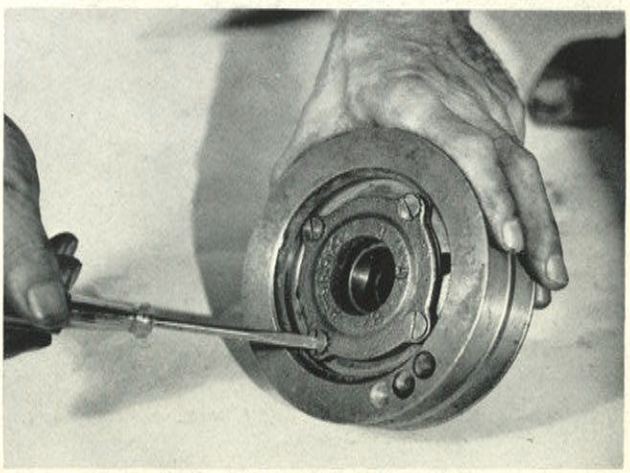
13 Insert special reamer (SE-12681) through pilot adapter (SE-12682). *Use lard oil on reamer.* Line ream both bushings at same time. *NOTE:* A slight pressure on reamer may be required to cause it to enter bushings and start reaming. Perform reaming operation carefully and *do not exert side pressure on reamer.*



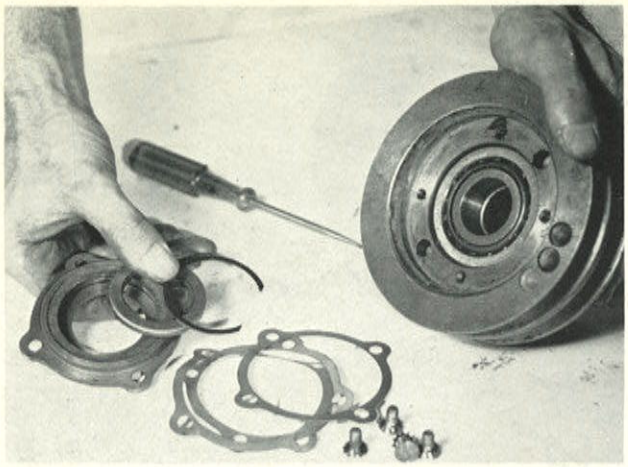
14 Remove set screw and fan pulley lock nut as shown.



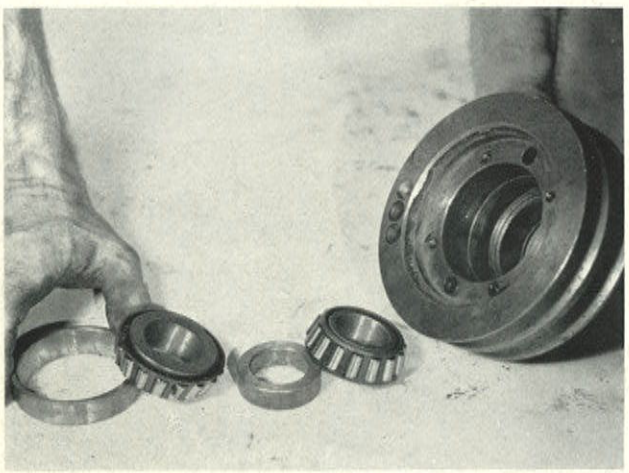
15 Screw packing nut into sleeve. Pulley assembly can then generally be removed easily by inverting pump sharply on bench. Remove pulley. Rea spacer can then be removed from sleeve.



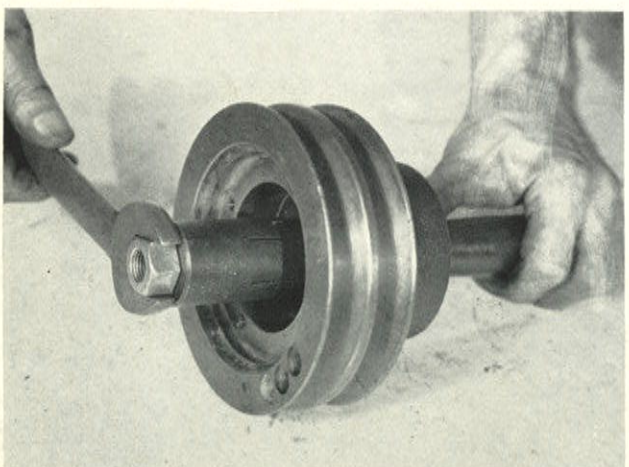
16 Remove screws and lock-washers from bearing and seal retainer.



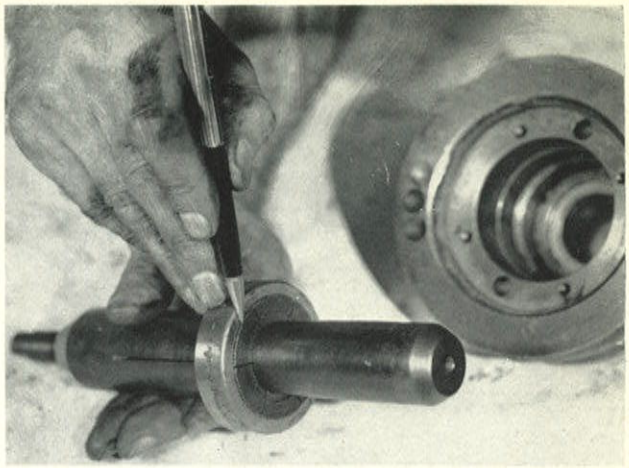
17 Remove seal retainer snap ring with screw driver. Above are shown end play control shims, seal and seal cup. Shims control end play to from .001″ to .003″ and are varied in thickness.



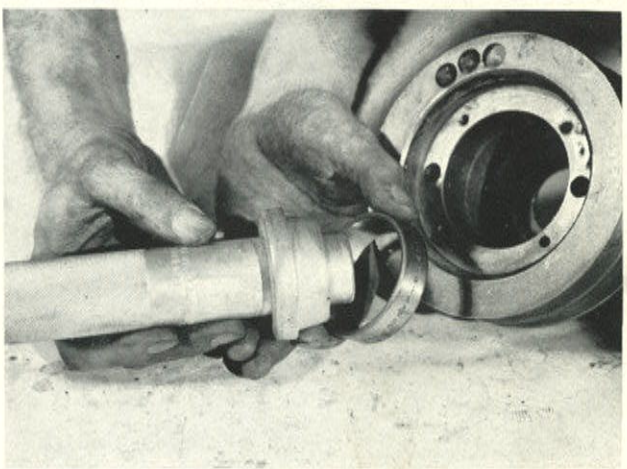
18 Rear bearing cup and cone, spacer, and front bearing cone are now easily removed from the pulley. Above are shown parts in manner of assembly.



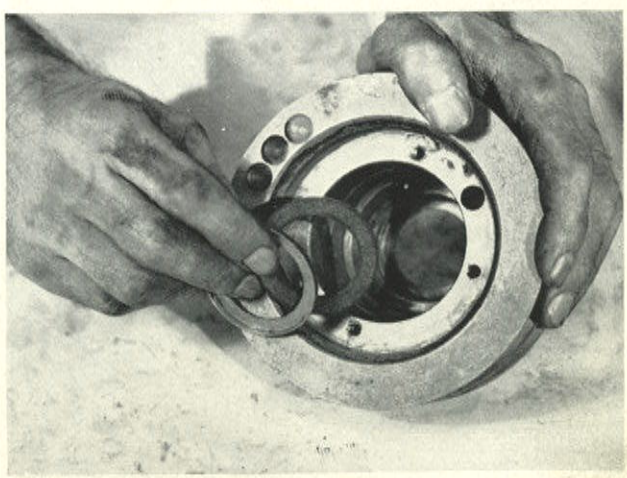
19 The front bearing cup can best be removed using special tool (SE-10291) installed as shown. Screw tapered portion of tool into expansion sleeve after forcing expansion sleeve well to bottom of cup. Locknut shown merely holds assembly. Knock or press out cup.



20 Sharp edge of expansion sleeve forces itself underneath cup as shown, thereby accomplishing cup removal.



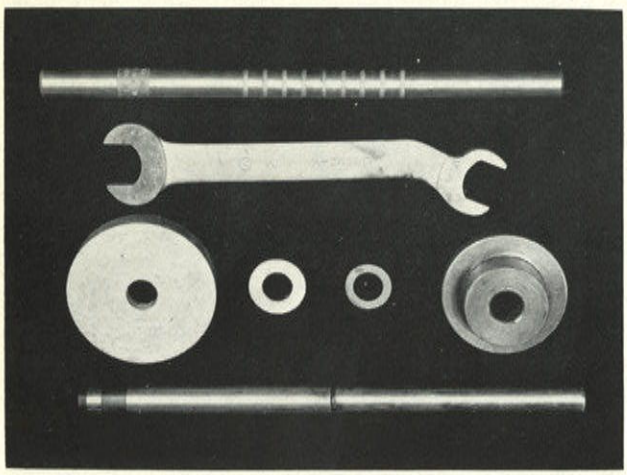
21 Special driver (SE-10292) is designed to be used for inserting the front bearing cup.



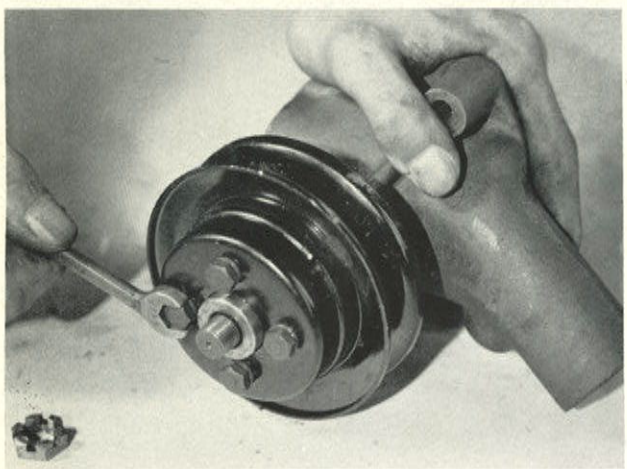
22 Front seal retainer cup and seal can now be easily lifted out. *NOTE:* Proper position of seal cup assembly is shown. *Do not invert retainer.*

International Green Diamond (GRD) Engines—K-Line Trucks

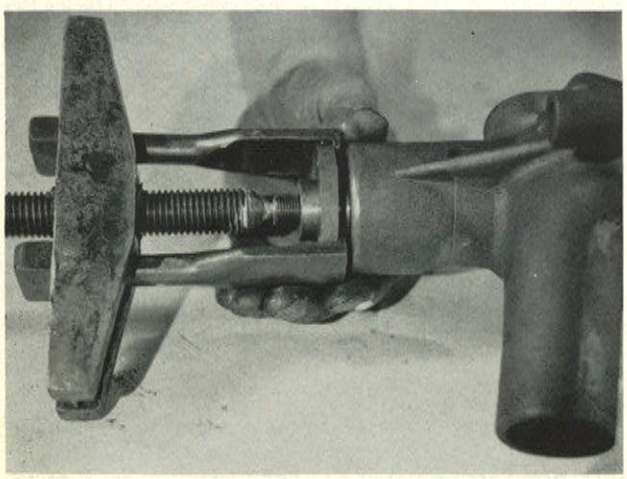
The water pump on Green Diamond (GRD) engines is simi ar in general design to the HD engine pump. A ball bearing is used at the front of the pump instead of a bushing.



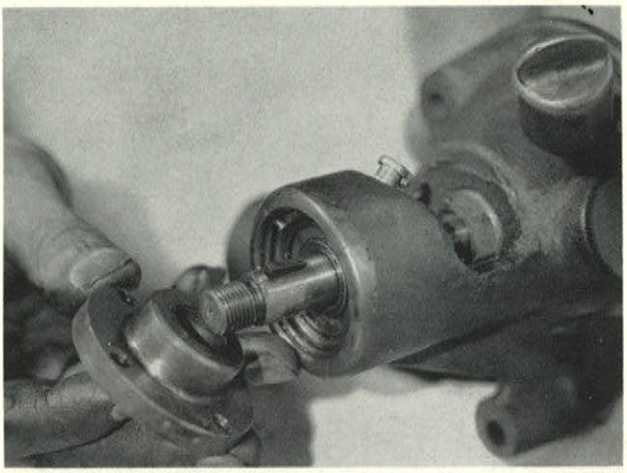
1 Special tools required for pump service on GRD engines are shown above.



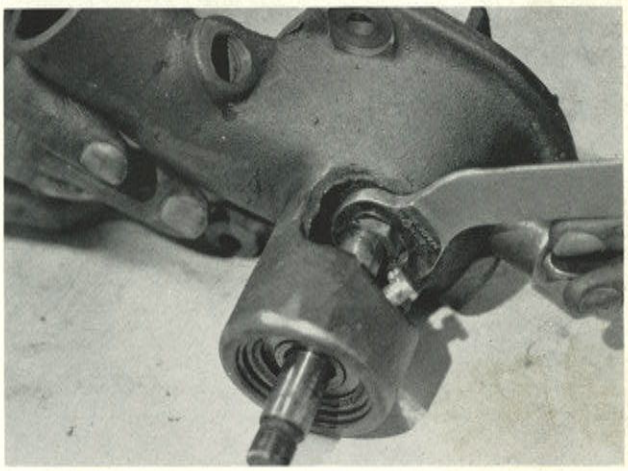
2 Remove fan pulley retaining nut and retaining capscrews as shown. (Fan blades not shown).



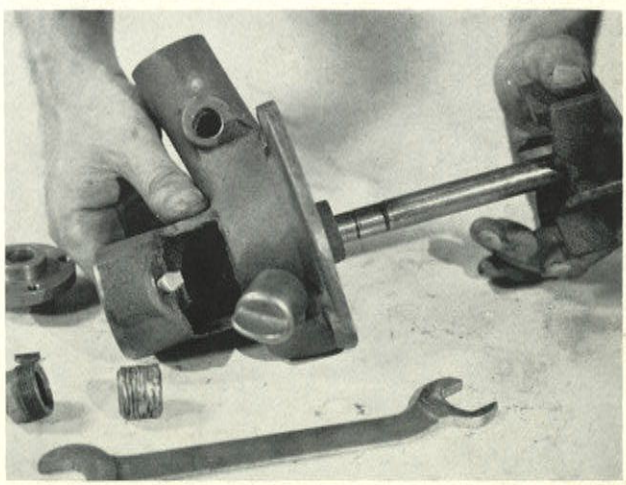
3 Remove fan pulley hub as shown. Use a puller similar to SE-967.



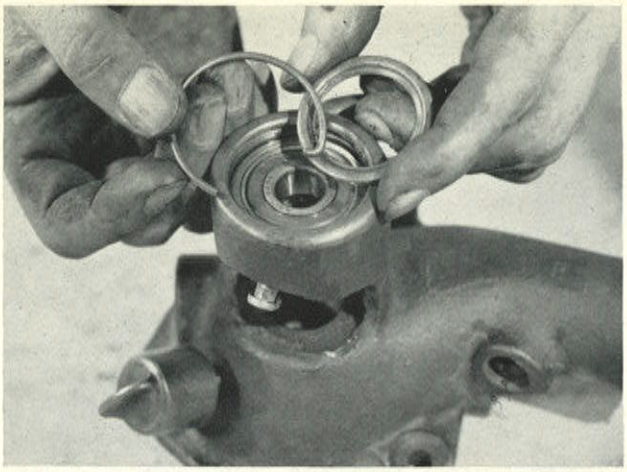
4 Removal of pulley hub will reveal retaining key and also front bearing. Remove key.



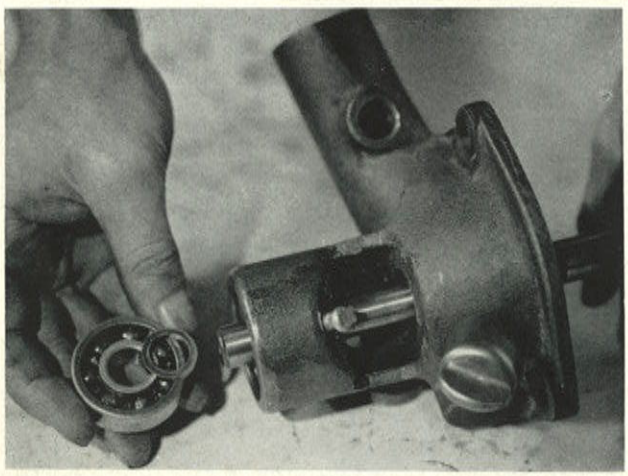
5 Loosen packing gland nut, using special wrench SE-969.



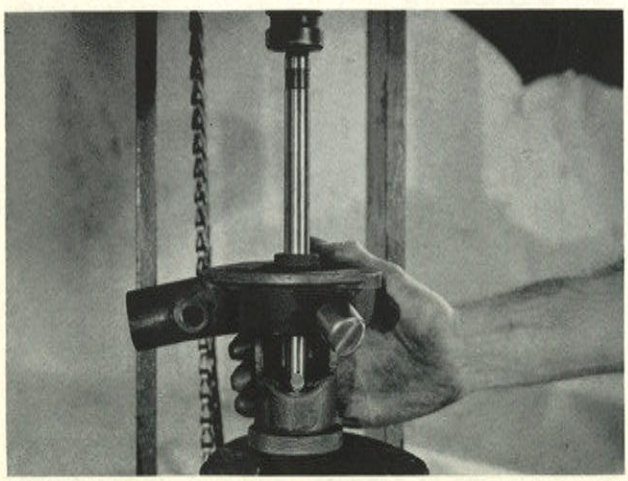
6 Withdraw impeller shaft and remove packing gland nut and packing.



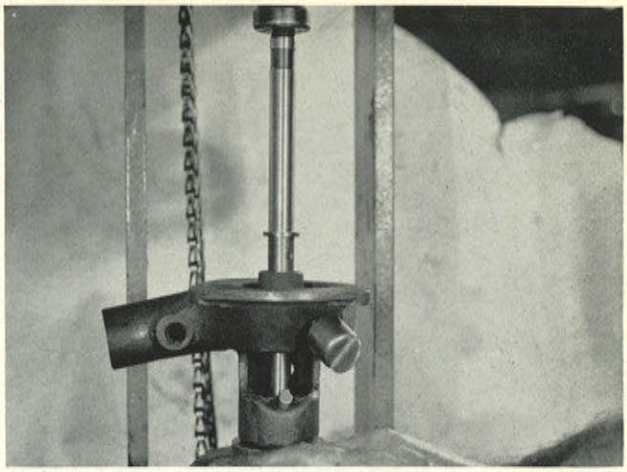
7 Remove snap ring from bearing retainer. *NOTE:* Be sure to replace retainer in same position. *Do not invert retainer.*



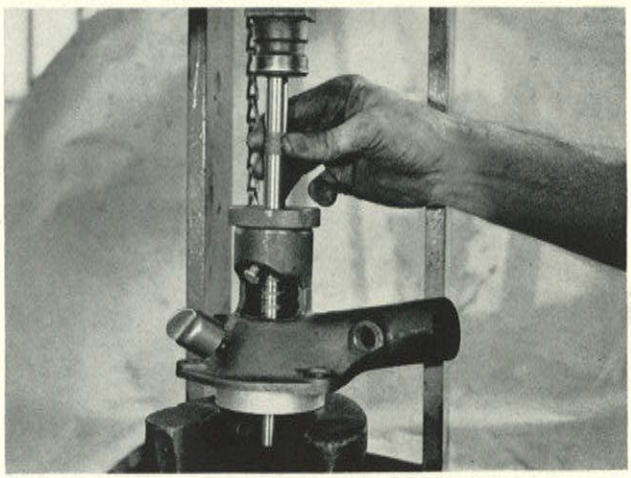
8 After removal of snap ring and bearing retainer, bearing and spacer washer can be pushed out using arbor (SE-963). Next remove the oil seal and seal retainer.



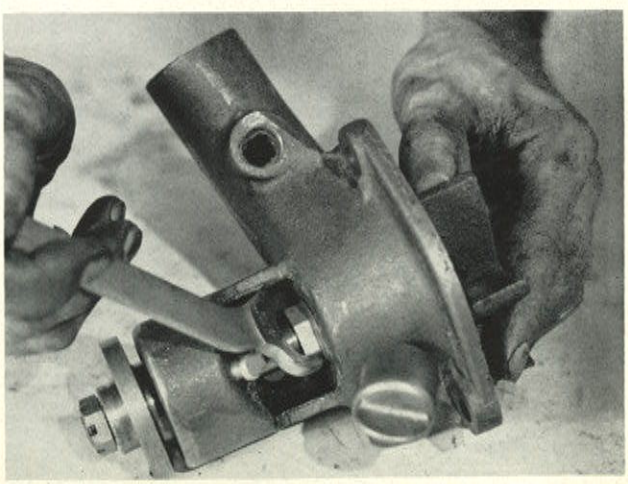
9 Support pump on adapter (SE-1237). Insert arbor (SE-963) in *rear* bushing and press out bushing.



10 With pump still supported on adapter (SE-1237), install special flat washer on arbor (SE-963) and press new *rear* bushing into place. Be sure to line up oil holes.



11 Invert pump and support on support plate (SE-968). Pilot burnishing bar (SE-964) in adapter (SE-1237) and burnish rear bushing. Use lard oil on burnishing bar. No further reaming or burnishing is required.

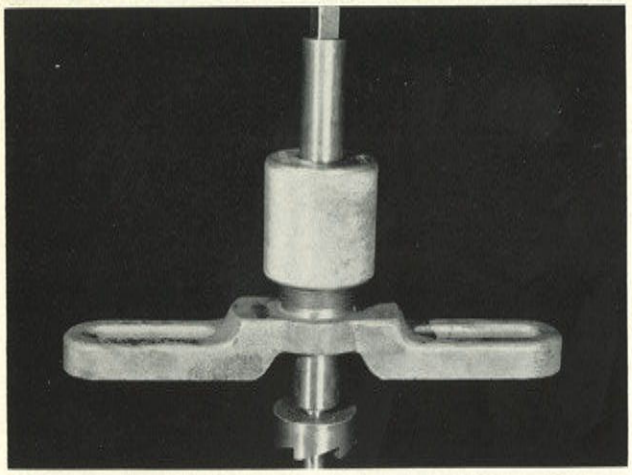


12 Reassemble pump. Tighten pump packing gland nut using special wrench (SE-969). Do not tighten excessively, for scored shaft might result.

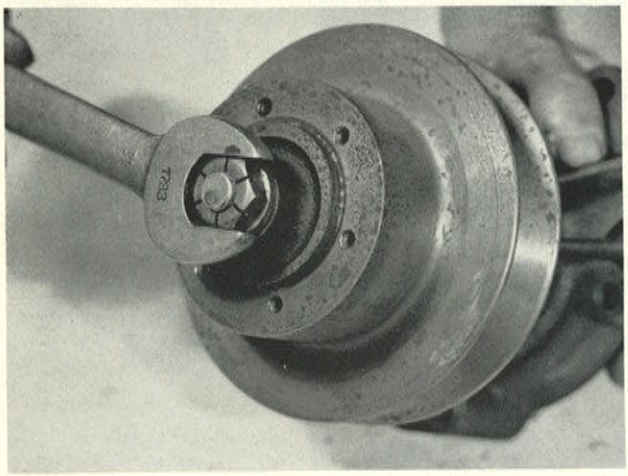
NOTE: Upon reassembly, test grease cup for free passage of lubricant through cup.

International FAC and FBC Engines—K-Line Trucks

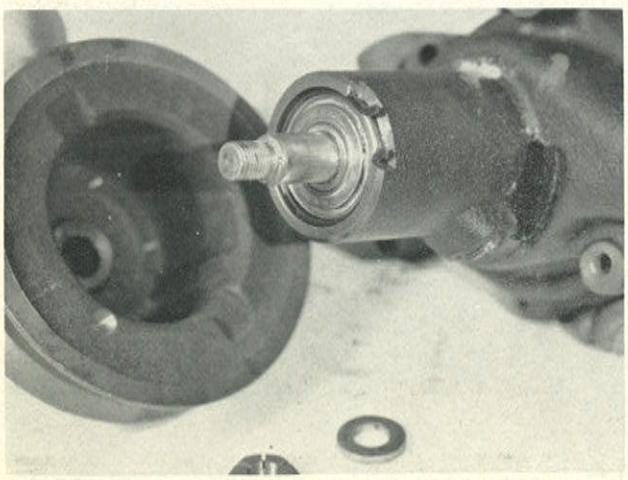
Water pumps on FAC and FBC engines in K-line trucks are of packless design and service procedure is as follows: (FAC engine pump shown).



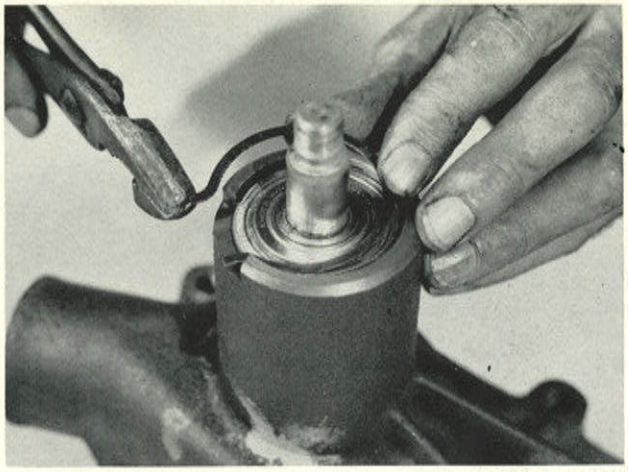
1 The only special tool required in service of these pumps is the SE-1278 facing cutter shown above.



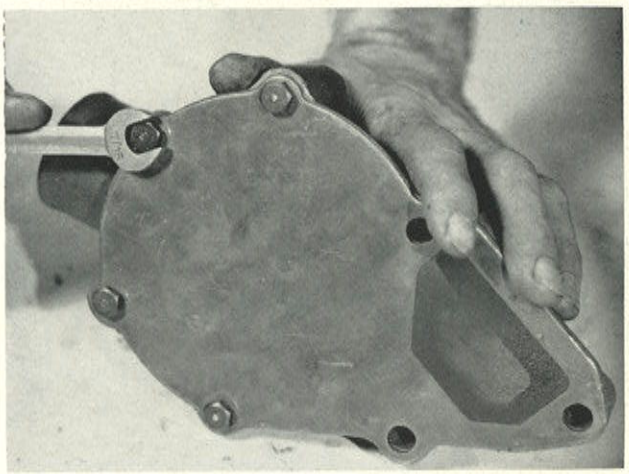
2 Remove fan pulley retaining nut as shown. *NOTE:* Early production engines used a special lock nut not requiring a cotter key. Later production pumps require a cotter and the shaft is drilled for this purpose.



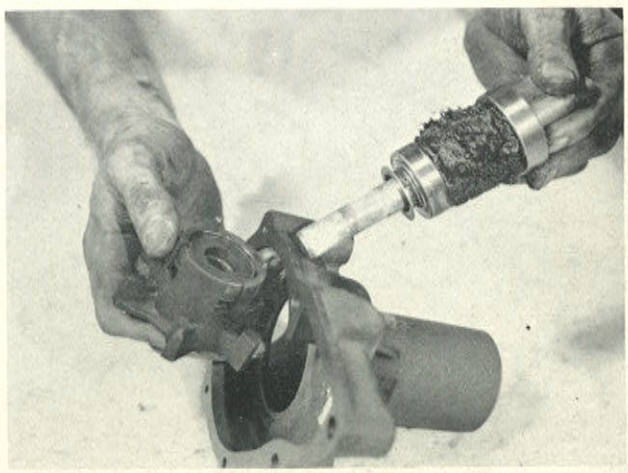
3 Remove fan pulley from pump, by either pressing or by using puller. *CAUTION:* Exercise care not to damage flanges of pulley.



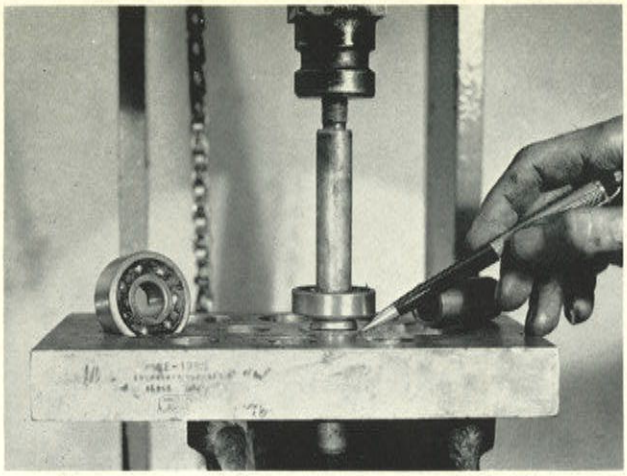
4 Remove snap ring from pump front bearing as shown.



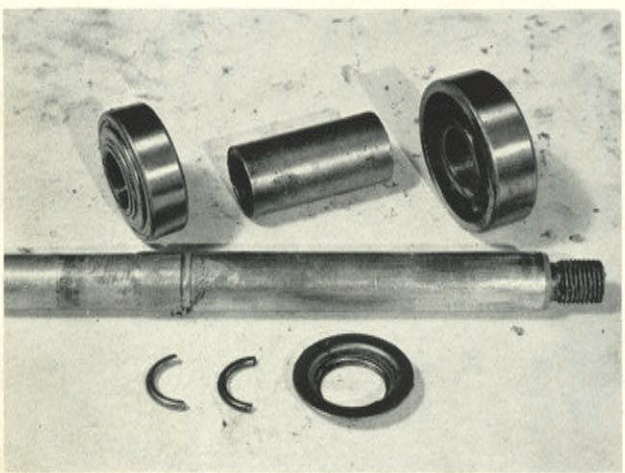
5 Remove capscrews holding pump rear cover plate. Remove plate and gasket.



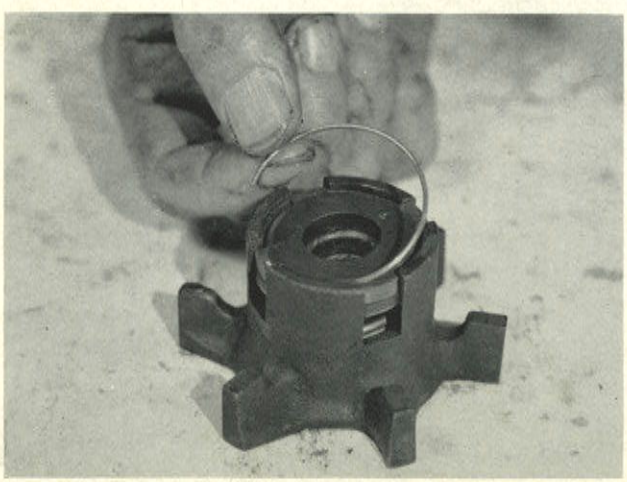
6 Press impeller shaft out of impeller *from the rear.* Impeller shaft and bearings assembly will be removed *as an assembly.*



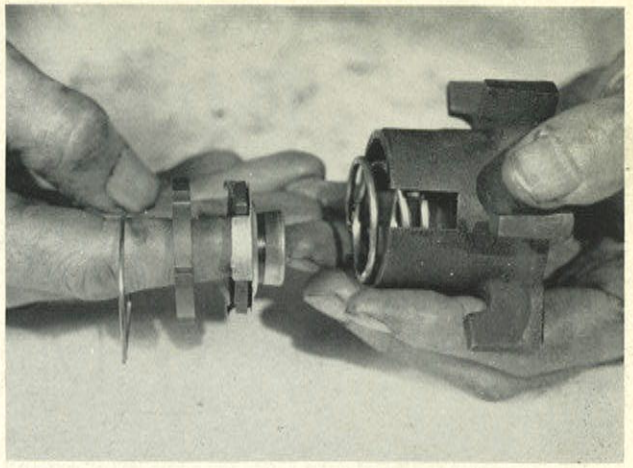
7 Press impeller shaft from bearings, sleeve, slinger, and remove lock rings. Support block (SE-1033) is ideal for this purpose.



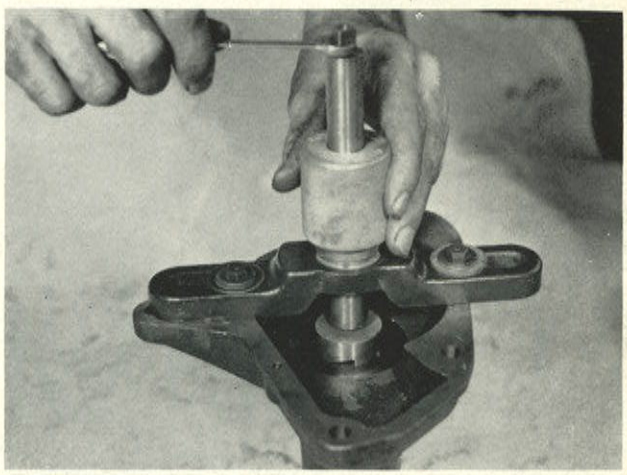
8 Parts involved in the impeller shaft assembly are shown above.



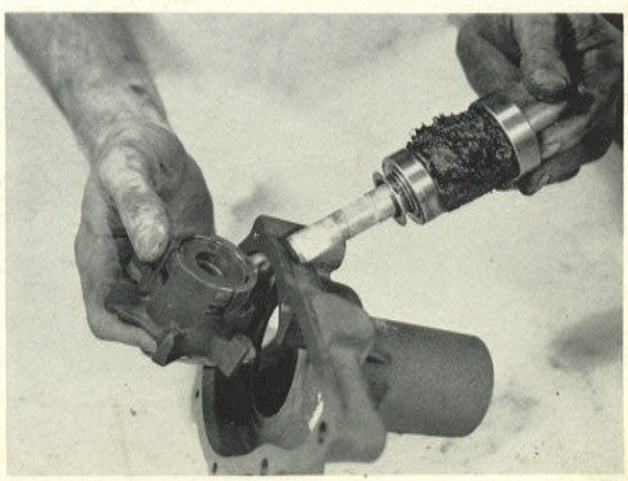
9 Remove snap ring from impeller assembly as shown. Remove seal washer, seal and spring.



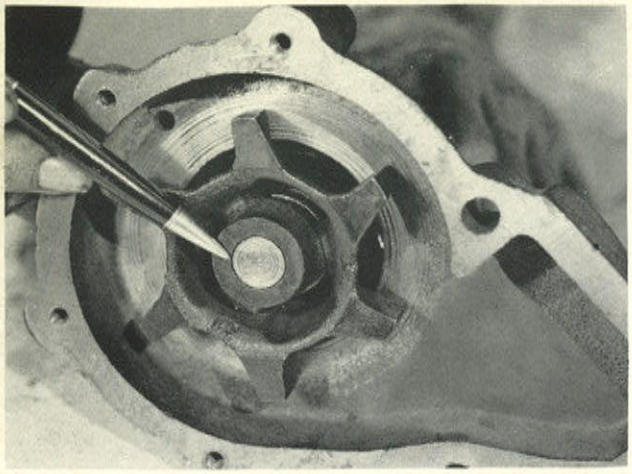
10 Parts involved in this impeller assembly are shown above, in the order of their assembly.



11 Check thrust face of housing for wear. If surface is not true and smooth the special facing tool (SE-1278) must be used to *lightly* reface housing. Housing facing tool (SE-1278) is shown mounted in position.



12 When reassembling water pump, assemble by units. Install the impeller shaft and bearings as a unit, and then press impeller and seal assembly *down onto shaft.*



13 When pressing impeller assembly onto impeller shaft, only press to end of shaft as shown.

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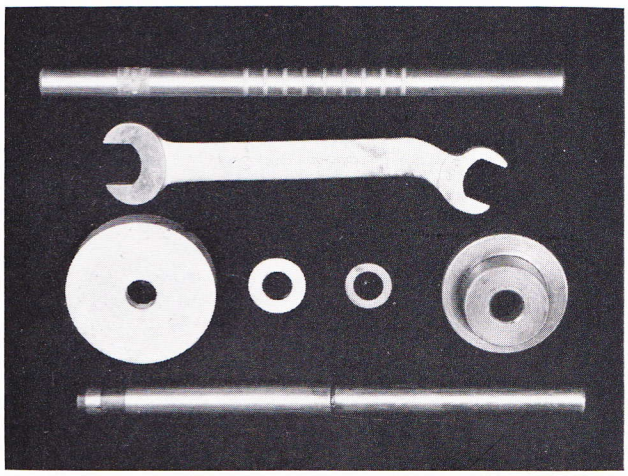
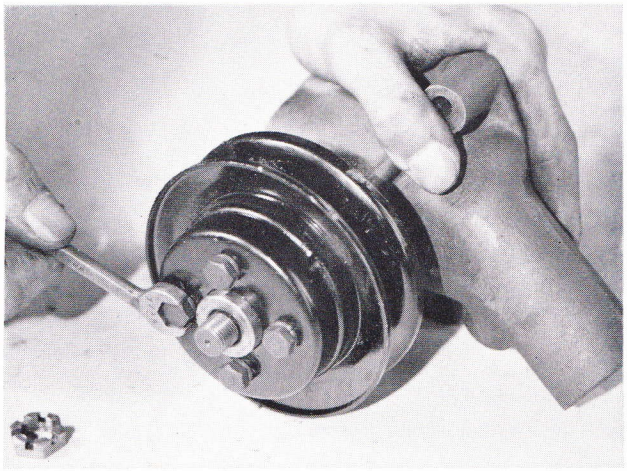
International Green Diamond (GRD) Engines—K-Line Trucks (NOT MECHANICAL SEAL)

(For Mechanical Seal Type Pump See Page 13)

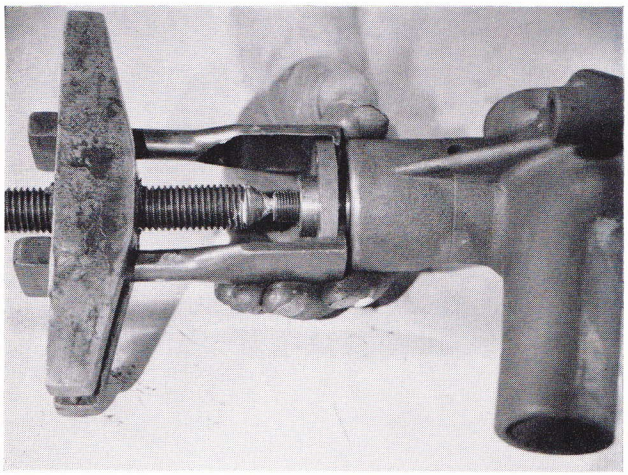
The water pump on Green Diamond (GRD) engines is similar in general design to the HD engine pump. A ball bearing is used at the front of the pump instead of a bushing.



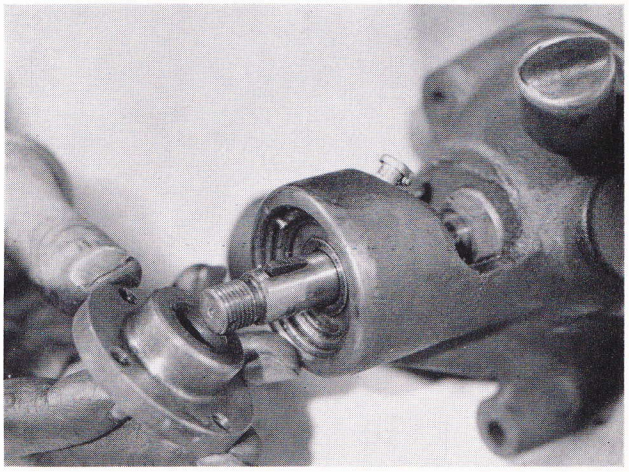
1 Special tools required for pump service on GRD engines are shown above.



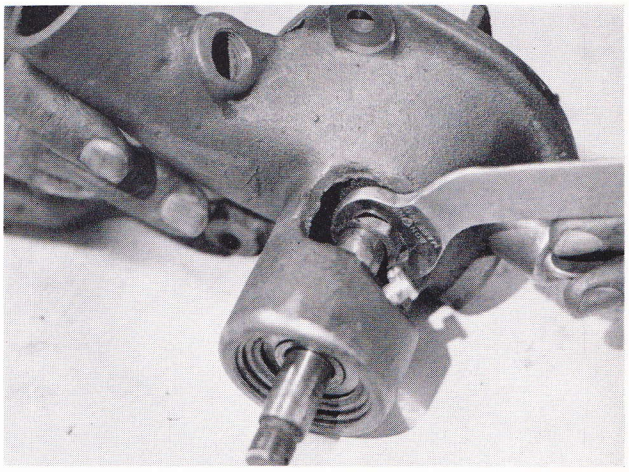
2 Remove fan pulley retaining nut and retaining capscrews as shown. (Fan blades not shown).



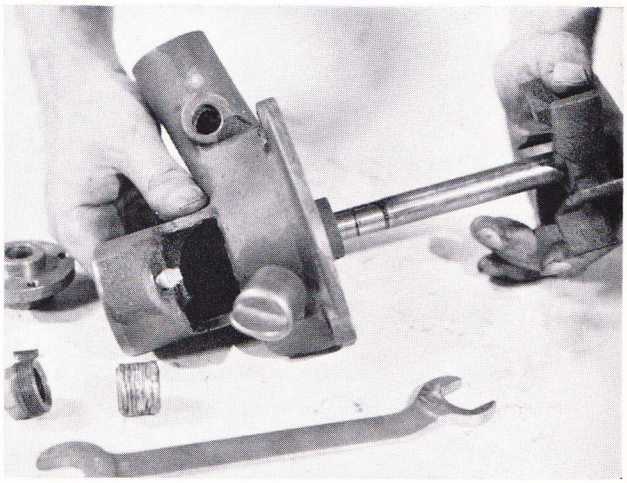
3 Remove fan pulley hub as shown. Use a puller similar to SE-967.



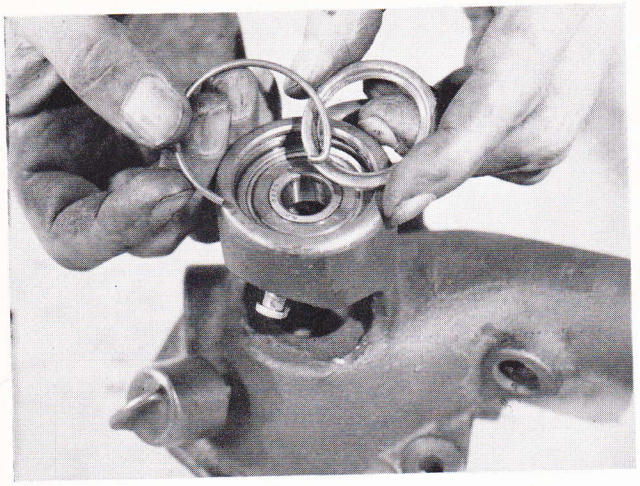
4 Removal of pulley hub will reveal retaining key and also front bearing. Remove key.



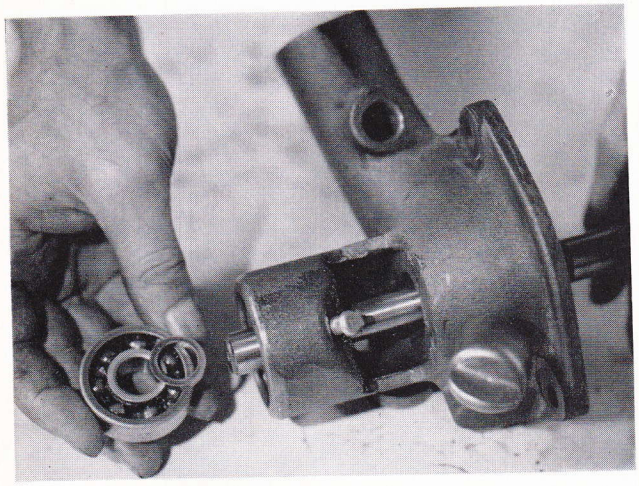
5 Loosen packing gland nut, using special wrench SE-969.



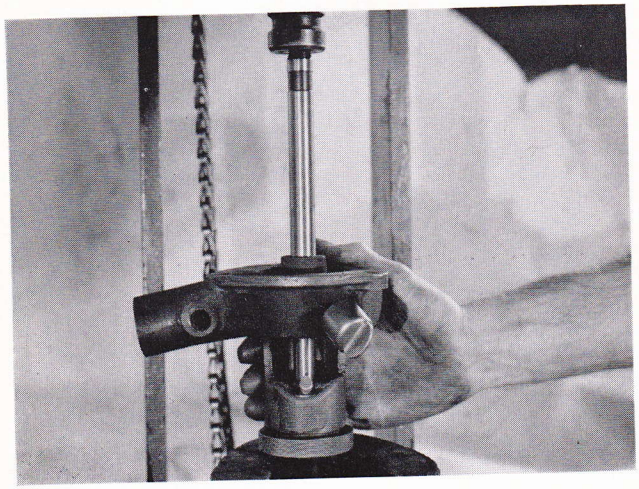
6 Withdraw impeller shaft and remove packing gland nut and packing.



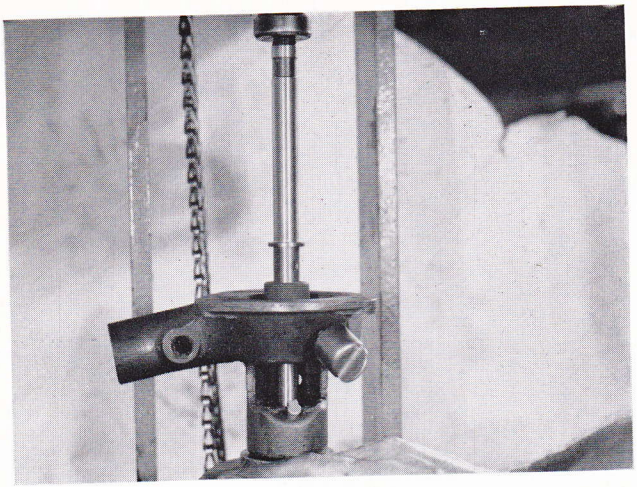
7 Remove snap ring from bearing retainer. *NOTE:* Be sure to replace retainer in same position. *Do not invert retainer.*



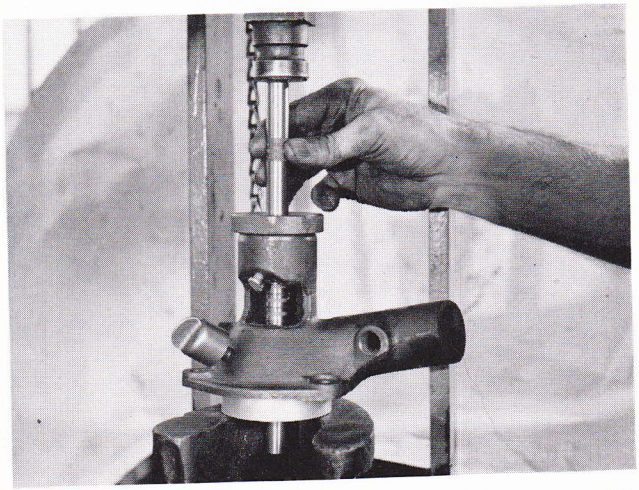
8 After removal of snap ring and bearing retainer, bearing and spacer washer can be pushed out using arbor (SE-963). Next remove the oil seal and seal retainer.



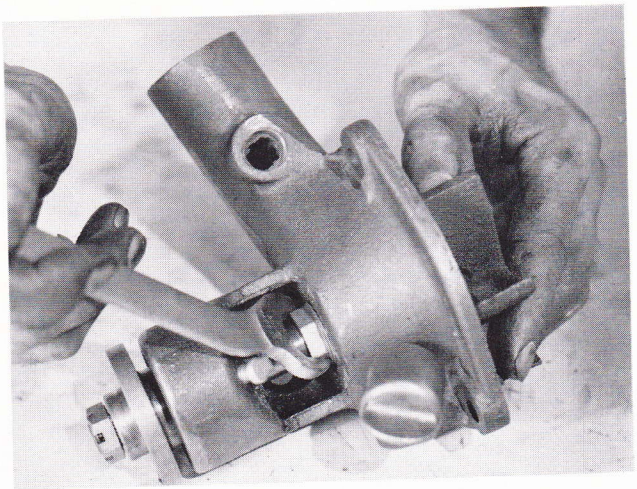
9 Support pump on adapter (SE-1237). Insert arbor (SE-963) in *rear* bushing and press out bushing.



10 With pump still supported on adapter (SE-1237), install special flat washer on arbor (SE-963) and press new *rear* bushing into place. Be sure to line up oil holes.



11 Invert pump and support on support plate (SE-968). Pilot burnishing bar (SE-964) in adapter (SE-1237) and burnish rear bushing. Use lard oil on burnishing bar. No further reaming or burnishing is required.



12 Reassemble pump. Tighten pump packing gland nut using special wrench (SE-969). Do not tighten excessively, for scored shaft might result.

NOTE: Upon reassembly, test grease cup for free passage of lubricant through cup.

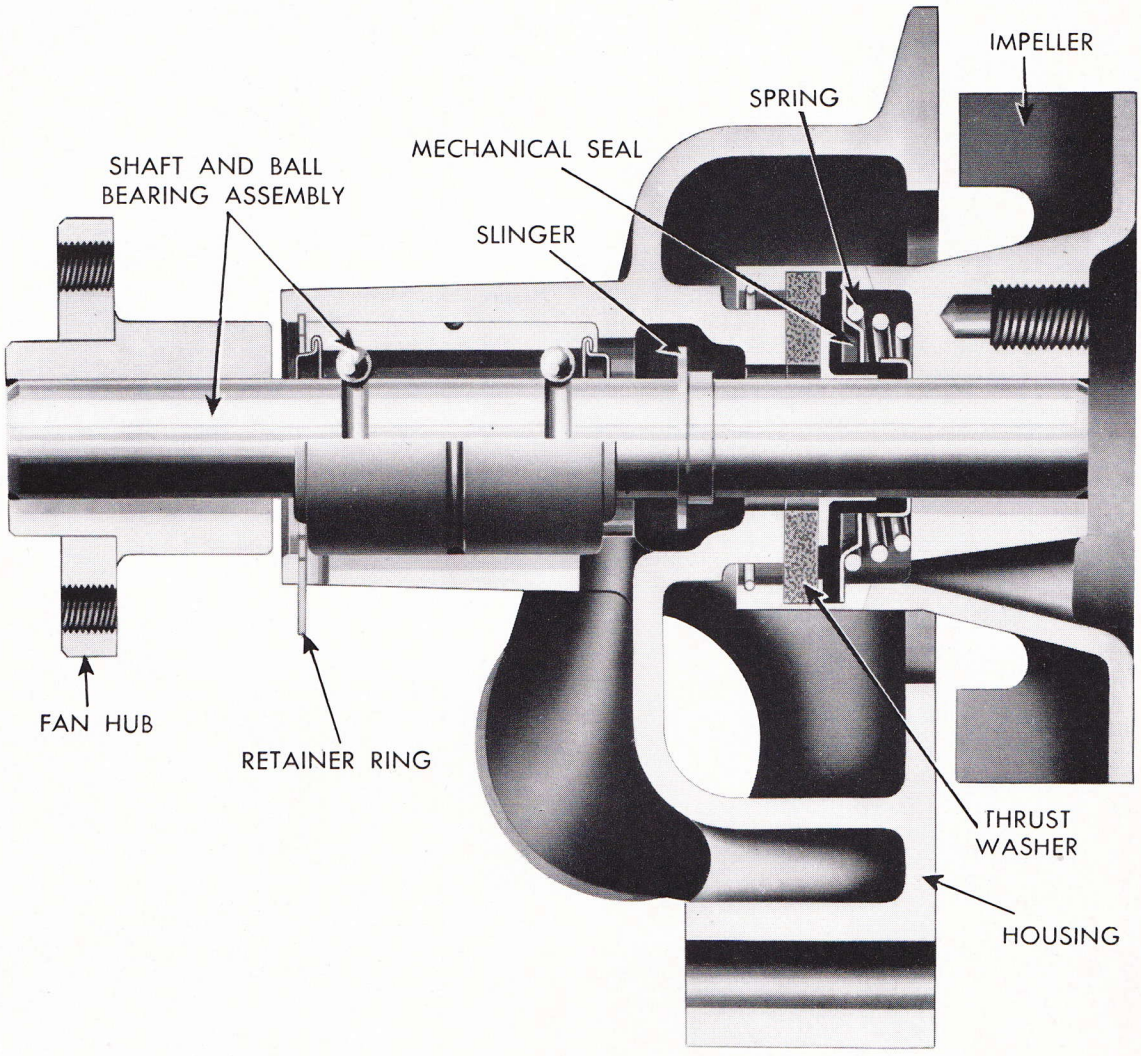
International GRD and H.D Engines

(MECHANICAL SEAL)

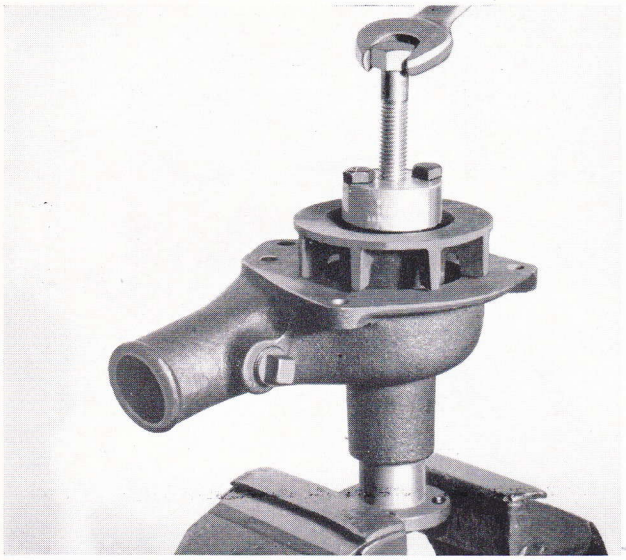
A new water pump incorporating a mechanical seal is now used on the above engines. The design of this pump is somewhat similar to the mechanical seal water pump being used on the K-line FA, BLD, FB and RED engines.

The mechanical seal water pump assembly is interchangeable with the old and is used for both production and service requirements.

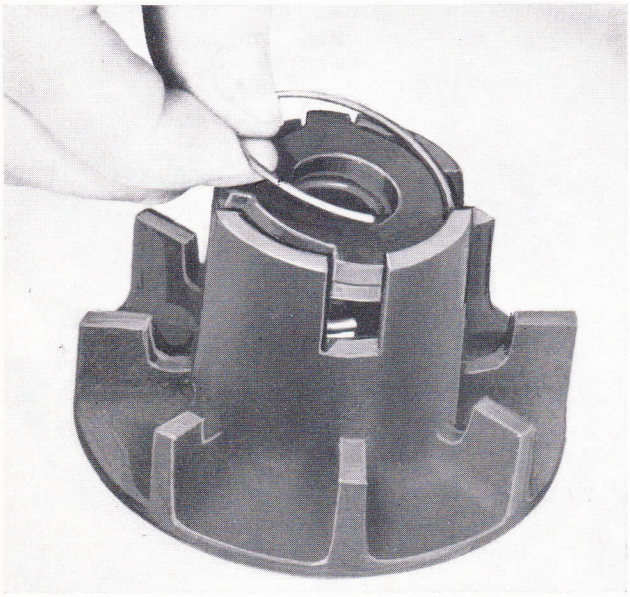
Illustrations 1 to 12 inclusive illustrate, in detail, the overhaul procedure to be followed when servicing the new pump.



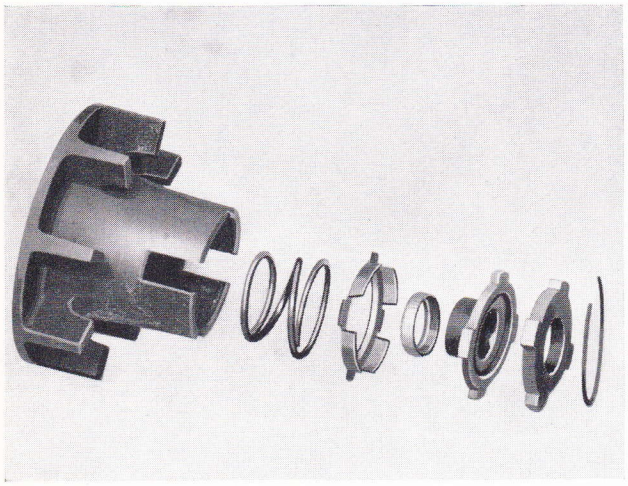
Sectional View of Mechanical Seal Pump.



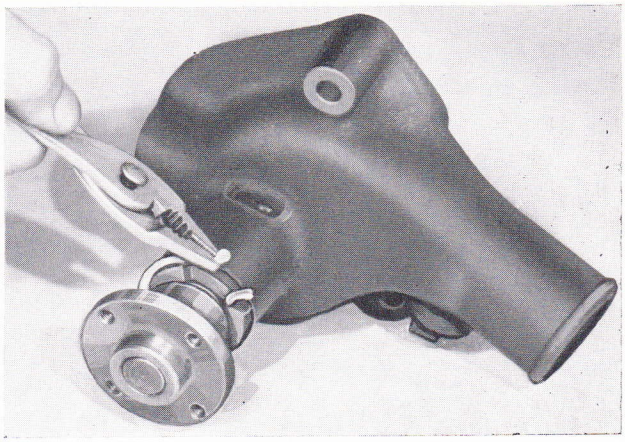
1 Remove impeller from pump shaft. Use screw type puller and utilize tapped holes in impeller.



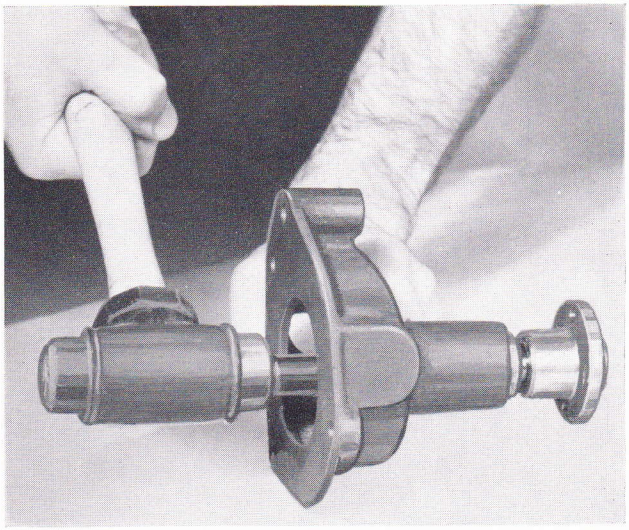
2 Remove snap ring from groove in impeller.



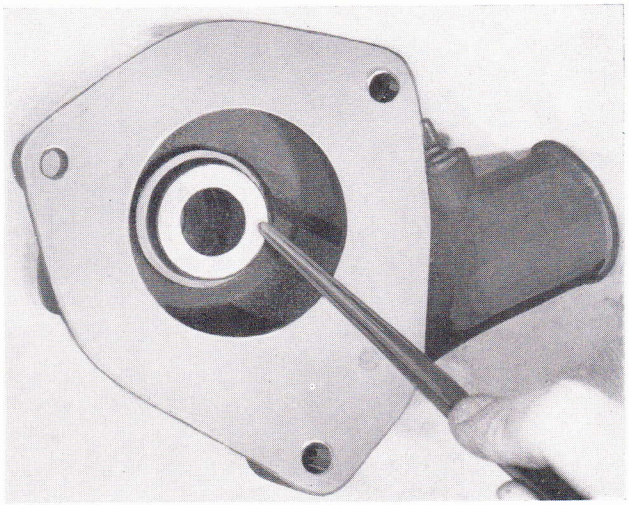
3 Component parts and assembly sequence of the seal and impeller.



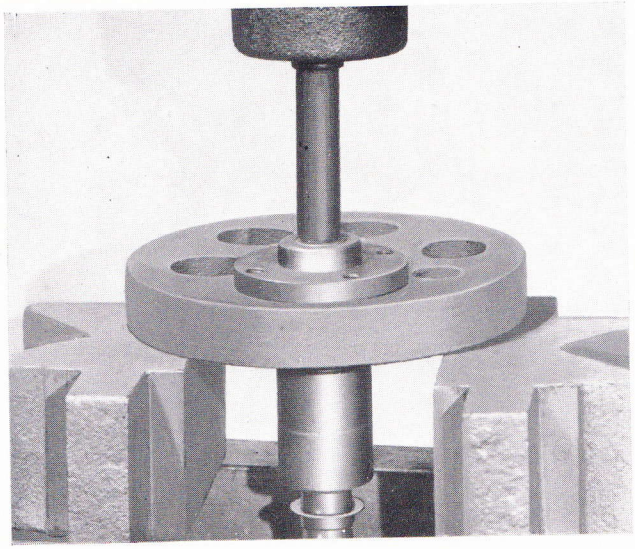
4 Remove bearing retainer snap ring from housing.



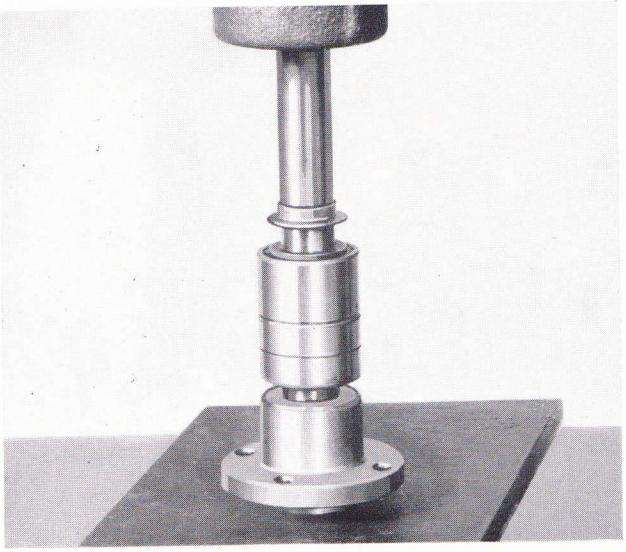
5 Drive pump shaft and bearing from pump body. Note: The pump shaft and bearing assembly is of one-piece construction. The bearing must not be removed from the shaft.



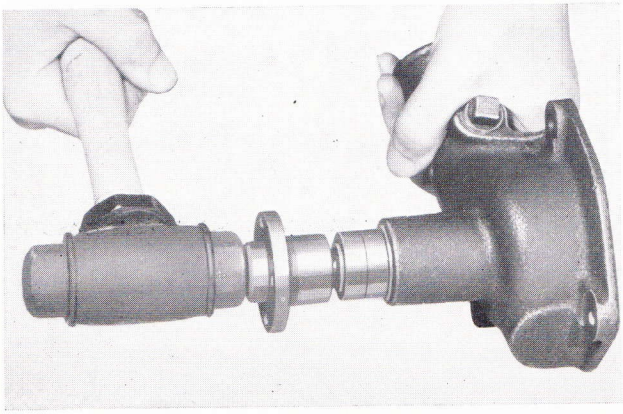
6 Inspect seal thrust surface in pump body. If rough or grooved—reface, removing as little material as possible.



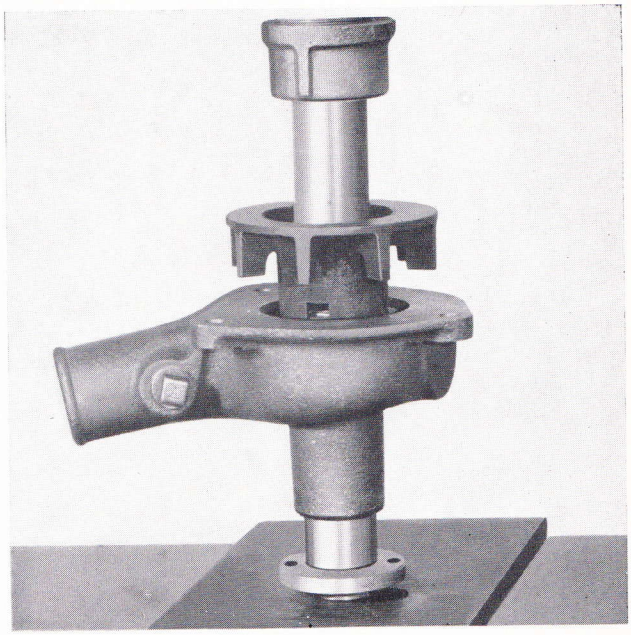
7 Press pump shaft from fan pulley hub.



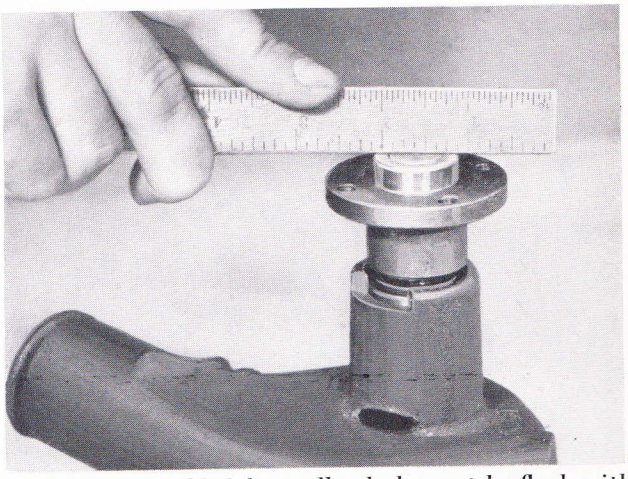
8 Press fan pulley hub on to shaft. Pulley hub must be flush with end of shaft as shown in Figure 11.



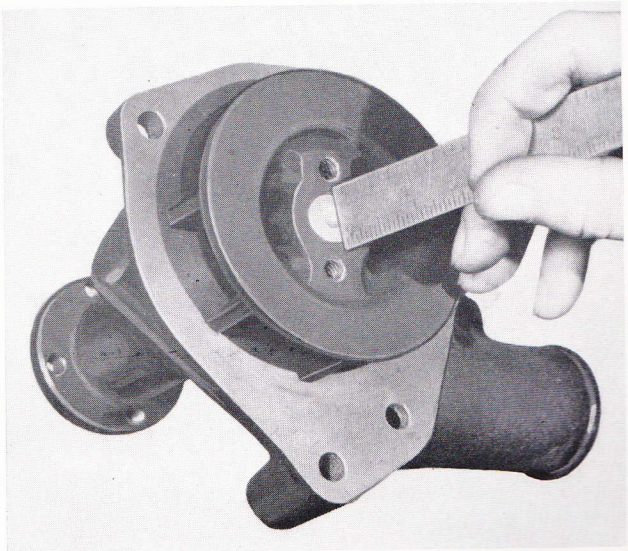
9 Install shaft into pump body and install bearing retainer snap ring.



10 Assemble seal and impeller hub in the sequence shown in Figure 3. Install snap ring. Press impeller and seal assembly on to shaft. (Impeller must be flush with end of shaft as shown in Figure 12.)



11 The assembled fan pulley hub must be flush with end of shaft.



12 The assembled impeller must be flush with end of shaft.